United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with the Regents of the University of California (Agricultural Experiment Station); United States Department of Agriculture, Forest Service; California Department of Forestry, Soil Vegetation Survey; and United States Department of the Interior, Bureau of Land Management

Soil Survey of Intermountain Area, California,

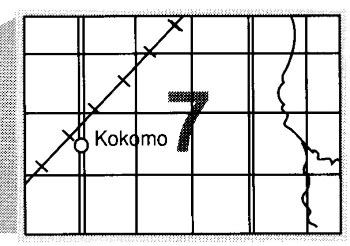
Parts of Lassen, Modoc, Shasta, and Siskiyou Counties

How To Use This Soil Survey

General Soil Map

The general soil map shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

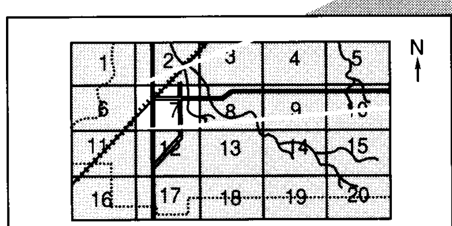


MAP SHEET

Detailed Soil Maps

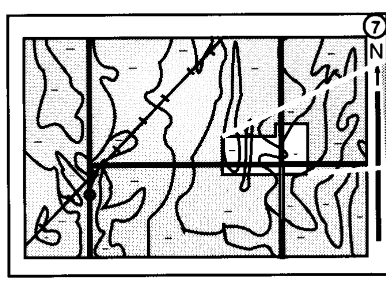
The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

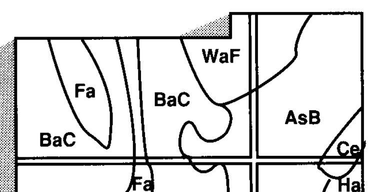


INDEX TO MAP SHEETS

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.



MAP SHEET



AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1990. Soil names and descriptions were approved in 1994. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1994. This survey was made cooperatively by the Natural Resources Conservation Service and Forest Service; the California Department of Forestry, Soil Vegetation Survey; the University of California Agricultural Experiment Station; and the United States Department of the Interior, Bureau of Land Management. The survey is part of the technical assistance furnished to the Fall River and Pit Resource Conservation Districts.

Cover: A typical landscape characteristic of the basin and plateau topography of the survey area. In the foreground is the Day Bench area. In the distance, across the Fall River Valley, is Mount Shasta.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov (click on "Technical Resources").

Contents

Issued 2000

Foreword

This soil survey contains information that can be used in land-planning programs in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations that affect various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Jeffrey R. Vonk
State Conservationist
Natural Resources Conservation Service

Soil Survey of Intermountain Area, California, Parts of Lassen, Modoc, Shasta, and Siskiyou Counties

By Charles A. Ferrari, Natural Resources Conservation Service

Fieldwork by Dean W. Burkett, Charles A. Ferrari, Myron J. Baer, Arthur F. Fisher, Terrance L. Huff, and John P. Osborn, Natural Resources Conservation Service; supporting field information by John W. Bramhall, Thomas E. Tauser, and James D. Komar, Natural Resources Conservation Service, and Robert Powell, University of California, Davis

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
the United States Department of Agriculture, Forest Service; the California Department of Forestry, Soil Vegetation Survey; the University of California Agricultural Experiment Station; and the United States Department of the Interior, Bureau of Land Management

The Intermountain area includes the northwestern part of Lassen County, the southwestern part of Modoc County, the southeastern part of Siskiyou County, and the northeastern part of Shasta County (fig. 1). It has an area of 1,135,228 acres, or about 1,774 square miles. The northern part of the survey area is bordered by the Modoc National Forest to the east and by the Shasta-Trinity National Forest to the west. The eastern part is bordered by the Modoc National Forest to the north and the Lassen National Forest to the south. The southern part is bordered by the Lassen National Forest to the east and the Shasta-Trinity National Forest to the west. The western part is bordered by the Shasta-Trinity National Forest and in some areas the Shasta Area and Siskiyou Area soil survey areas.

Soils in the soil survey area are primarily used for timber production and livestock grazing in areas of the lava plateaus, hills, and mountains and for agriculture in the basin areas. Elevations range from 1,000 feet in the Big Bend area to 7,863 feet on Burney Mountain.

A survey of the Big Valley area was published in the 1920’s (Watson and Cosby, 1924). This survey included parts of the present survey area. Also, several quadrangles from the survey area have been published by the Soil Vegetation Survey, California Department of Forestry, starting in the early 1960’s. A reconnaissance survey of all four counties was published in the 1960’s. The present survey updates all earlier surveys and provides additional information and interpretations.

General Nature of the Survey Area

This section provides general information about the survey area. It describes the first inhabitants; history and development; water supply; physiography, relief, and drainage; water supply; natural vegetation; and climate.

First Inhabitants

The earliest recorded inhabitants of the survey area were American Indians, primarily the Achumawi and Atsugawi tribes. Their presence in the area was recorded in the mid 1800’s by American and British trappers and explorers, refugees of the California

Figure 1.—Location of the survey area in California.

gold rush, travelers passing through, and others who stayed to develop the area (Fort Crook Historical Society, 1975).

Several Indian tribes occupying the Intermountain area were related to the Achumawi. Some lived in and around the Dixie Valley on Horse Creek, in Fall River Valley, in Big Valley, and along the upper McCloud River.

Food for the Indians in Fall River was abundant. Plants in the area included tule shoots, camass roots, several types of lilies, Indian potatoes, seed-bearing grasses, epos roots, wild garlic, wild turnip, wild buckwheat, and fruit from yew, manzanita, wild plum, and Oregongrape. Small game included salmon, ducks, geese, cranes, sage hens, quail, badger, groundhogs, squirrels, rabbits, martins, suckers, trout, and pike. Large game included deer, antelope, elk, bear, and a few bison. The Indians used pits to trap the game; the Pit River was named for this method (Fort Crook Historical Society, 1975).

History and Development

Access to the area and a transportation system for products were the most limiting factors in developing the full potential of the survey area.

The first settlers to enter the Intermountain area were trappers from the Hudson Bay Company. They arrived in the 1830's and trapped the plentiful beaver in many waterways in the area of Fall River, Hat Creek, and the Pit River and then continued their journey to the Sacramento Valley (Fort Crook Historical Society, 1975).

Later, people interested in investigating the agricultural possibilities of California came to the area (Fort Crook Historical Society, 1975). In the 1840's many travelers left the Applegate Trail at the southern end of Goose Lake and followed the old trapper route down the Pit River to Horse Creek. Some emigrants took a more difficult route, keeping to the mountains. This route was so difficult, however, that it became known as the “Death Trail.” The difficult access kept the Intermountain area from being part of an important emigrant route.

In 1850, rumors of a lake of gold somewhere in the mountains of northeastern California sent hundreds of miners into the wilderness. Many followed the Pit River and entered Fall River and Big Valley in search of their dreams. The Hayden Hill area was a major mining development. It was the center of gold rush activity from the time when gold was discovered in Lassen County in 1869 until the 1890's.

Despite fears of Indian attacks, many areas were being settled by the 1860's. By 1869, all of the soldiers had been withdrawn from Fort Crook.

Many towns and locations were named after the early explorers and settlers. Hat Creek, however, was so named by D.D. Herril, who lost his hat in the water in the days when store hats were scarce in California (Shasta County Historical Society, 1977).

The first road (now part of Highway 299) to serve as the main link in the Intermountain area was originated by Colonel James L. Freaner in 1851. Freaner was given permission to build a road from Yreka to the Sacramento Valley via the Pit River. By 1856, regular stages were traveling this route. Also, many others established toll roads throughout the area. In the late 1880's these roads were declared public roads.

Burgettville, founded by Bill Burgett, was the first town in the Fall River Valley. It was located on the Fall River, a couple of miles south of Fort Crook. In 1888, the town's name was changed to Swasey.

Captain William Winter is generally recognized as the founder of Fall City. Struck by the beauty and potential wealth of the area, he began buying land around the confluence of the Fall River and the Pit River. In the 1870's, the inhabitants of Fall City had high hopes of exporting their goods. A toll road was built from Burney Valley to Fall River. The Central Pacific Railroad planned to establish a route that

would facilitate the export of products from the area, but heavy snows during 1874 prevented work on the route. Finally, in June 1892, the Southern Pacific Railroad built a track to Bartle. By April 1893, the grade to Burney Valley was almost completed, and by August 1897, the McCloud River Railroad completed the tracks to the mill in Burney.

The early settlers grew many of the crops that are grown today in the area, such as hay and small grain. The livestock, including sheep and cattle, grazed throughout the area. They would graze into the higher elevations as the snows melted and would return to the lower elevations when the first storms came.

In an attempt to attract more people into the area, one early pioneer claimed that fruit trees would grow well. The short frost-free season, however, made this claim untrue. In 1896, J.W. Zumwalt established a farm on land that is now the town of McArthur. He planted timber west of the town, and thus was probably the first silviculturist in the area.

Since the 1850’s, forest was considered an important resource in the area. The Timber and Stone Act of 1878, which was a program developed by the United States government, encouraged citizens to develop and harvest the woods. Any citizen could buy as much as 160 acres of government land for $2.50 per acre, provided it could be shown that the land was unfit for cultivation and therefore was more valuable for its timber and stone.

The development of the railroad system also stimulated the commercial development of forest products in the area. Many speculators bought large tracts of land for this purpose.

In 1852, Ross McCloud explored the river for a possible wagon route from Yreka to Shasta. In 1892, the town of McCloud was established. It was to be the final point of the Sisson and McCloud Railroad in Squaw Valley. McCloud was the center of much of the lumber business in Squaw Valley and upper McCloud country until the road was extended further on.

In 1922, Raymond Berry, a New Jersey lawyer, arrived to build the Scott Lumber Company. By 1955, the timber industry in the Burney Valley area was producing large quantities of finished lumber.

Engineers surveying in 1912 and 1913 described the vast power potential of the lava reservoir lying beneath the area northeast of the Cascade Range. The Pacific Gas and Electric Company (PG&E) later called this reservoir “The Magic Pool.” In 1917, Frank Baum, an electrical engineer, convinced PG&E to develop power in Hat Creek and below and in the Upper Pit River and below, in confluence with the Fall River. By 1921, PG&E was ready to capture this hydroelectric power. Transporting heavy materials and power plant machinery from Bartle, however, where the McCloud River Railroad came closest to the Pit Projects, was difficult. Materials had to be brought to Bartle, unloaded, and transported by horse-drawn conveyances over the 30 miles or so of dirt roads. Finally, PG&E built a railroad some 33 miles from Bartle to Pit One. This project now includes six Pit River power plants, two Hat Creek power plants, and some 1,100 feet of tunnel dug from the Fall River to Pit Powerhouse One.

Another resource mined in the area is diatomaceous earth, which is a concentration of the skeletons of freshwater diatoms that existed millions of years ago. This material is used mainly in many kinds of filters.

Water Supply

Depending on the area and the intended use, the delivery of water has varied in the survey area. In the Hat Creek area, for example, the pioneer Gilbert Worley and his family diverted water from Hat Creek by some 400 feet of tunnels. They used the water to irrigate hay and grain. Many early settlers farming the McArthur swamp first depended on the high water table in this area for their hay crops. They later drained and diverted the water by digging ditches so they could grow grain and alfalfa.

The availability and quality of water vary throughout the area. Growers in Big Valley depend on the Pit River for their water supplies. They sometimes run out of water before the end of the growing season, since this part of the river is fed predominantly by mountain runoff. Also, the quality of water decreases as the flow of the river decreases.

Growers in the Fall River Valley depend on the Fall River for their water. This river is fed by springs from a gigantic underground reservoir of water. According to estimates by the Department of Water Resources, the largest of these springs has a flow of 100,000 gallons per minute. The quality of this water is good throughout the year. In areas far from the rivers, most of the water for domestic use and for crops is supplied by ground water.

The clear, cool, and rushing water of Hat Creek has been the site of a fish hatchery since 1885. At that time, the hatchery produced 4 million salmon each year.

Physiography, Relief, and Drainage

The survey area is primarily within the Modoc Plateau and Cascade Mountains province of California. Some parts are in the Klamath Mountains.

The Modoc Plateau is a broad highland area built up of irregular masses of volcanic materials, predominantly basalt. As a result of block faulting, distinct basins and hills have formed. The major basins or valleys in the area are Burney Basin, Fall River Valley, and Big Valley.

The Cascade Mountains, west of the Modoc Plateau, are primarily composed of a volcanic mountain chain. Because of the volcanic activity that has occurred throughout the development of this area, the boundary between these two provinces is not distinct. The most predominant mountains crossing the survey area in a northeastern direction are Mount Lassen, Burney Mountain, and Mount Shasta.

The Klamath Mountains, west of the Cascade Mountains, are primarily composed of metamorphosed sedimentary and volcanic rocks.

The Pit River, the primary drainageway in the area, is a main tributary to the Sacramento River. The Pit River begins as an outlet of Goose Lake, which is outside the survey area. It flows in a southerly direction, cuts through the Modoc Plateau and Cascade Range, and flows into the Sacramento River some 18 miles above Shasta. Throughout the Pit River's journey of more than 200 miles, spring-fed streams, such as the Fall River, Burney Creek, and Hat Creek, transform the murky stream into a full-grown, roaring river that contributes 80 percent of the water of the Sacramento River as measured at Red Bluff.

All of the spring-fed streams had their beginnings from porous lava, which freely permits the passage of water. This water is stored in vast underground reservoirs and reaches the surface in several areas, such as the northern end of the Fall River Valley.

Natural Vegetation

The kind of vegetation in the survey area is largely controlled by the moisture available for plant growth. Available moisture is primarily a function of precipitation, soil temperature, and soil depth. The vegetation is dominantly Douglas-fir, ferns, and maple in the areas that have a higher available moisture supply. These areas consist of deep soils on the mountains. The vegetation is open sagebrush and grasses in the areas that have a lower available moisture supply, which are areas of shallow soils on the lava plateaus.

In areas where the soils have similar temperatures, textures, and depths, the amount of precipitation has an influence on the kinds of vegetation that grow. White fir, for example, grows in areas of higher precipitation. Jeffrey pine grows in areas of lower precipitation.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Adin, Hat Creek, and McCloud in the period 1951 to 1984. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation ranges from about 16 to 53 inches. Of this, about 27 to 96 inches falls as snow.

The climate in the survey area is largely controlled by the mountain and basin topography. Most storms move in from the southwest. Rain-shadow areas are on the east side of the mountains and in the valleys. Rain or snow is heaviest in the western part of the area and decreases to the east toward the basins. The Burney area, for example, which is on the west side of Hatchett Mountain, has about twice as much snowfall as Burney Basin. Also, on many occasions throughout the year there may be rainfall in the mountains but clear skies in the Fall River Valley or the Big Valley. This pattern shows the influence of topography on precipitation levels in the area.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and

other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size, and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Mesic Soils in Basins Or on Stream Or Fan Terraces With Slight Volcanic Influence

The soils in this group are dominantly in the lower valleys at the lower elevations. Part of the surface layer has very little identifiable ash from past volcanic events. This group makes up about 7 percent of the survey area.

1. Pit-Pastolla-Lasvar

Very deep and moderately deep, nearly level, somewhat poorly drained to very poorly drained soils

These soils formed in alluvium derived from lacustrine sediments and from other extrusive igneous rock. Elevation ranges from about 3,310 feet in the Fall River Valley area to about 4,800 feet in the Egg Lake area. The average annual precipitation is 12 to 35 inches, and the average annual temperature is 45 to 52 degrees F. The average frost-free season ranges from about 50 days in the Burney area to about 130 days in the Fall River area. Slopes range from 0 to 2 percent.

This unit is 38 percent Pit and similar soils, such as Longbilly, Pitvar, and Swanberger soils; 22 percent Pastolla and similar soils; 11 percent Lasvar and similar soils, such as Cupvar soils; and 29 percent soils of minor extent. The minor soils are Whipp soils in basins; Keddie soils on flood plains and in basins; Burman soils on fan terraces and basin edges; Odas soils on small flood plains along streams; Stoner soils on alluvial fans; Nosoni soils on stream terraces and basin edges; and Dosa, Dudgen, thick surface, Jadpor, Lunsford, Modoc, Matquaw, and Patburn soils on stream terraces.

Pit soils are very deep and are poorly drained. They are on stream terraces and in basins. The surface layer is silty clay underlain by clay and silty clay loam. The substratum is silt loam.

Pastolla soils are very deep and are very poorly drained. They are in basins. The surface layer is muck. The subsurface layer is mucky silt loam. It is underlain by stratified sandy loam to clay.

Lasvar soils are moderately deep and are somewhat poorly drained. They are in basins and drainageways and on fan terraces. The surface layer is clay. It is underlain by a thick hardpan.

Areas of this unit are used mainly for irrigated crops, livestock grazing, or wetland wildlife habitat. These areas provide extremely important nesting habitat for ducks and geese. Every effort should be made to preserve these areas for the waterfowl flyways.

Soil characteristics affecting the management of this unit are a high water table, flooding, ponding, soil blowing, sodicity, salinity, and slow permeability. The ponding, the high water table, and the flooding are favorable for the high production of forage for grazing and for wetland wildlife. Soil blowing can be controlled by keeping the soil surface rough, using emergency tillage, stripcropping, and establishing windbreaks or permanent pastures. The sodicity and salinity can be overcome by toxic salt reduction, application of soil amendments, or both. Because of the level of salts and the high pH, however, this unit is best suited to the creation and management of wetlands for waterfowl. Because of the slow permeability, an irrigation design that includes low application rates

and longer application periods is needed to satisfy crop requirements and to prevent crop damage.

Frigid Soils in Basins Or on Stream Terraces Or Alluvial Fans With Slight Volcanic Influence

The soils in this group are dominantly in the lower positions on the landscape at the higher elevations, in areas where soil temperatures are cooler, or both. The surface layer has identifiable ash from past volcanic events. This group makes up about 1 percent of the survey area.

2. Nanny-Jacksback-Esro

Very deep, nearly level to moderately sloping, very poorly drained, poorly drained, and well drained soils

These soils formed in alluvium derived from extrusive igneous rock. Elevation ranges from about 4,000 feet near the McCloud area to about 6,200 feet in the Cal Pines area. The average annual precipitation is about 20 inches in the Cal Pines area to 60 inches in the McCloud area, and the average annual temperature is 39 to 50 degrees F. The average frost-free season ranges from 50 to 100 days. Slopes range from 0 to 9 percent.

This unit is 44 percent Nanny and similar soils, 26 percent Jacksback and similar soils, 20 percent Esro and similar soils, and 10 percent soils of minor extent. The minor soils are Gardens soils in basins.

Nanny soils are very deep and are well drained. They are on alluvial fans. Slopes range from 0 to 9 percent. The surface layer is gravelly sandy loam. It is underlain by very gravelly sandy loam.

Jacksback soils are very deep and are poorly drained. They are on stream terraces. Slopes range from 0 to 9 percent. The surface layer is loam. The subsoil is loam over sandy clay loam. It is underlain by stratified coarse sandy loam to silt loam.

Esro soils are very deep and are very poorly drained. They are in basins. Slopes range from 0 to 2 percent. The surface layer is silt loam. Below this is stratified silty clay loam and sandy clay loam underlain by very gravelly sandy clay loam.

Areas of Nanny and Jacksback soils are used mainly for timber production. Areas of Esro soils are used mainly for grazing or for wetland wildlife habitat. The livestock grazing is in late spring and summer, when forage is limited at the lower elevations.

In areas of the Jacksback soils, a high water table from March through May limits the period of time when timber can be harvested. Harvesting the timber during periods when the water table is low and the surface is dry helps to prevent compaction. Stands of lodgepole pine thrive and decline in a cyclic pattern that depends upon climatic patterns. Unsurfaced roads are slippery and unstable and may be impassable during rainy periods. When the water table is near the surface, vehicles can become stranded and deep channels and compaction can occur. The cost of maintaining roads is severely impacted by the seasonal high water table. Culverts should be installed when roads are constructed.

Livestock management activities in winter and spring can be impaired by flooding, the high water table, and ponding. When these areas are seeded, adapted species should be selected. Deferring the use of equipment during periods when the water table is high helps to prevent compaction or damage to vegetation. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. Deferring livestock grazing in areas that have a cover of herbaceous vegetation promotes nesting if these areas are adjacent to wetlands.

Mesic Soils on Stream Terraces With Slight Volcanic Influence

The soils in this group are dominantly in the higher positions on stream terraces and basins of the major valleys throughout the area. Part of the surface layer has little identifiable ash from past volcanic events. Most of the soils in this group have a hardpan and a claypan, which may limit the production of a variety of crops. This group makes up about 10 percent of the survey area.

3. Modoc-Oxendine-Bieber

Shallow to moderately deep, nearly level to moderately sloping, moderately well drained to well drained soils

This map unit is dominantly in the Big Valley area. It is characterized by mound-intermound topography. The soils formed in alluvium derived from extrusive igneous rocks, lake sediments, and sedimentary rock. Elevation ranges from 4,000 to 4,800 feet. The average annual precipitation is 12 to 16 inches, and the average annual temperature is 48 to 50 degrees F. The average frost-free period is 80 to 120 days. Slopes range from 0 to 9 percent.

This unit makes up about 6 percent of the survey area. It is about 31 percent Modoc and similar soils, such as Sweagert soils; 24 percent Oxendine and similar soils; 15 percent Bieber and similar soils; and 30 percent soils of minor extent. The minor soils are Cupvar soils in basins and Chalkford, Dotta, Esperanza, and Patburn soils on stream terraces.

Modoc soils are moderately deep and are well drained. They are on stream terraces. Slopes range from 0 to 5 percent. The surface layer is sandy loam. The upper part of the subsoil is sandy clay loam, and the lower part is sandy clay. Below this is a thick hardpan.

Oxendine soils are shallow and are moderately well drained. They are on stream terraces. Slopes range from 0 to 9 percent. The surface layer is extremely gravelly sandy loam. The subsoil is sandy clay loam. It is underlain by a thick hardpan.

Bieber soils are shallow and are moderately well drained. They are on stream terraces. Slopes range from 0 to 5 percent. The surface layer is gravelly sandy loam. The subsurface layer is loam. The subsoil is clay loam and clay. It is underlain by a thick hardpan.

Areas of this unit are used mainly for irrigated crops or for pasture. A few areas are used for homesite development. The depth to bedrock, the depth to a hardpan or claypan, ponding, and frost heaving are management concerns. If irrigated crops are grown, proper timing of the applications of irrigation water is needed to prevent the development of a perched water table. The ponding can delay tillage. If the cemented pan has not been ripped or if there are areas that are shallow to bedrock, frequent irrigation cycles and controlled application rates are needed to prevent a perched water table.

In the shallow soils, forage production is limited by the shallow rooting depth. When these areas are seeded, species that are adapted to droughty conditions should be selected. If fences are constructed in areas of shallow soils, special designs may be needed. Chiseling or subsoiling may be needed in areas that have a claypan. Frost heaving can force bunchgrasses and sagebrush above the surface and leave pedestals exposed. Seeding may be required to increase the longevity of the stand. The effects of frost heaving can be minimized by maintaining a thick cover of vegetation.

If these soils are used for homesite development, the cemented pan, the shrink-swell potential, and restricted permeability are management concerns. The cemented pan can make a good base for a foundation, but it may increase the cost of developing a properly functioning septic system. If deep-rooted plants, such as trees, are planted, the cemented pan should be ripped. The effects of shrinking and swelling can be reduced by using proper engineering designs or backfilling with material that has a low shrink-swell potential. The cemented pan reduces the depth of the soil and thus reduces the capacity of septic system leach fields to absorb effluent. Tests should be run below the pan depth before lines are placed at this depth. The restricted permeability also reduces the absorption capacity of the leach fields. Increasing the size of the absorption field and using a specially designed system help to overcome this limitation. If the density of homesites increases, a community disposal system should be considered.

4. Pittville-Dudgen-Esperanza

Shallow, deep and very deep, gently sloping to moderately steep, moderately well drained to well drained soils

This map unit is dominantly in the Fall River Valley area closest to the Pit River. The soils formed in alluvium derived from extrusive igneous rock and, in some areas, from diatomite. Elevation ranges from 2,700 feet in the Fall River Valley area to 5,500 feet west of the Fall River Valley. The average annual precipitation is 12 to 50 inches, and the average annual temperature is 45 to 52 degrees F. The average frost-free period is 80 to 130 days. Slopes range from 0 to 30 percent.

This unit makes up about 4 percent of the survey area. It is about 34 percent Pittville and similar soils, 20 percent Dudgen and similar soils, 16 percent Esperanza and similar soils, and 30 percent soils of minor extent. The minor soils are Graven and Henhill soils on stream terraces.

Pittville soils are very deep and are well drained. They are on stream terraces. Slopes range from 0 to 30 percent. The surface layer is sandy loam. The subsoil is sandy clay loam. It is underlain by stratified sand to sandy loam over a hardpan (fig. 2).

Dudgen soils are shallow and are moderately well drained. They are on stream terraces. Slopes range from 0 to 2 percent. The surface layer is loam. The subsoil is clay loam and clay. It is underlain by a thin hardpan at a depth of about 15 inches. Below this is stratified very fine sandy loam to loamy sand.

Esperanza soils are deep and are well drained. They are on terraces. Slopes range from 0 to 5 percent. The surface layer is sandy loam. The upper part of the subsoil is loam over clay. The lower part is sandy clay loam. It is underlain by sandy loam. Below this is a hardpan.

Areas of this unit are used mainly for irrigated crops or for pasture. A few areas are used for homesite development. In areas of the Pittville soils, the main limitation is erosion on the steeper slopes. The Esperanza soils are limited by the claypan and by slow permeability. The Dudgen soils are limited by the claypan, slow permeability, a hardpan, and, in some areas, flooding. Chiseling or subsoiling may be

Figure 2.—The major soils in the southern part of the Fall River Valley are Pittville, Henhill, and Pit soils. In this photograph, the Pittville soils are in the highest positions on the landscape, the Henhill soils are directly below the Pittville soils, and the Pit soils are in the basins.

needed in areas that have a claypan. Because of the slow permeability, an irrigation design that includes low application rates and longer application periods is needed to satisfy crop requirements and to prevent crop damage. If the cemented pan in areas of the Dudgen soils has not been ripped, frequent irrigation cycles and controlled application rates should be applied to prevent a perched water table. If irrigated crops are grown, the timing of irrigation is very critical. The hazard of flooding should be considered before any cropping is done or capital improvements are installed. Sprinkler irrigation methods are suitable. During periods when the soils are bare, erosion can be controlled by crop residue management or the establishment of a cover crop. Limiting tillage for seedbed preparation and weed control helps to control runoff and erosion. In the more sloping areas, all tillage should be on the contour or across the slope. Also, water erosion can be controlled by seeding in early fall, by applying a system of conservation tillage, and by installing diversions and grassed waterways.

If these soils are used for homesite development, the depth to a hardpan and the restricted permeability are management concerns. In some areas the slope and flooding should be considered. The cost of developing a properly functioning septic system may be affected by soil limitations. Onsite investigation is

critical for the proper placement of a septic system. If the density of homesites increases, a community disposal system should be considered. The cemented pan reduces the depth of the soil and thus reduces the capacity of septic system leach fields to absorb effluent. Tests should be run below the pan depth before lines are placed at this depth. The restricted permeability and the flooding also reduce the absorption capacity of the leach fields. Increasing the size of the absorption field and using a specially designed system help to overcome this limitation. During and after construction, all bare ground should be mulched. An established ground cover prevents excessive erosion during rainy weather. Flooding may occur during winter and early spring. The foundation should be taller than normal, or the buildings should be located at the highest elevations. Water should be intercepted by drainage ditches, or a drainage system should be developed around the foundation.

Mesic Soils on Lava Plateaus With Slight Volcanic Influence

The soils in this group are dominantly in the intermediate positions on the landscape between the valleys and hills or mountains. Part of the surface layer has little identifiable ash from past volcanic events. This group makes up about 22 percent of the survey area.

5. Jellycamp-Jellico-Adinot

Shallow and moderately deep, gently sloping to steep, moderately well drained and well drained soils

This map unit is dominantly on the lava plateaus surrounding Big Valley and Fall River Valley. The soils formed in material derived from extrusive igneous rock. Elevation ranges from about 3,200 feet surrounding the Fall River Valley area to about 5,800 feet in the Silva Flat area. The average annual precipitation is 12 to 20 inches, and the average annual temperature is 45 to 50 degrees F. The average frost-free season ranges from about 50 days in the Silva Flat area to about 120 days near the Fall River and Big Valley area. Slopes range from 2 to 50 percent.

This unit is 29 percent Jellycamp and similar soils, such as Deven, Longcreek, and Vansickle soils; 19 percent Jellico and similar soils, such as Argixerolls and Orhood, Murken, Ricketts, Searvar, and Whitinger soils; 13 percent Adinot and similar soils, such as Malinda and Stukel soils; and 39 percent components of minor extent. The components of minor extent are Ravendale soils in basins; Badenaugh soils on fans and terraces; Daphnedale, Matquaw, and Dotta soils on stream terraces; Datom soils on knolls; Cuppy, Karcal, Lassen, and Ollierivas soils on lava plateaus; Coneward, Lonkey, and Splawn soils on lava plateaus and hills; Bunselmeier soils on hills and cindercones; Fiddler soils on hills; and lava flows, rock outcrop, and rubble land.

Jellycamp soils are shallow and moderately well drained. They are on lava plateaus. Slopes range from 2 to 15 percent. The surface layer is very cobbly loam. The subsoil is clay. It is underlain by a hardpan at a depth of about 11 inches. Below this is basalt.

Jellico soils are moderately deep and are well drained. They are on lava plateaus and hills. Slopes range from 5 to 50 percent. The surface layer is very cobbly silt loam. The subsoil is very stony silt loam. It is underlain by basalt.

Adinot soils are shallow and moderately well drained. They are on pediments and hills. Slopes range from 2 to 30 percent. The surface layer is very gravelly sandy loam. The subsoil is gravelly loam in the upper part and gravelly and very gravelly clay loam in the lower part. It is underlain by tuff.

The soils in this unit are used mainly for livestock grazing or for wood products, mainly western juniper. A few areas where the precipitation is greatest are used for timber production. The major soil limitations in this unit are depth to rock or depth to a hardpan. Forage production is limited.

Mesic Soils on Lava Plateaus and Hills With Strong Volcanic Influence

The soils in this group are dominantly in the higher positions on the landscape below the highest mountains in the area. The surface layer and part of the subsurface layer or subsoil have identifiable ash from past volcanic events. This group makes up about 44 percent of the survey area. The major management concerns are the hazard of erosion, surface compaction, and plant competition. Proper amounts and distribution of organic materials, such as limbs and needles, can reduce the fire hazard. Organic materials are the future source of organic matter, which provides nutrients and maintains long-term productivity. Maintaining a cover of vegetation, such as stumps and limbs, on 20 to 80 percent of the surface helps to control erosion during intense rainfall and spring snowmelt. The amount of surface cover needed depends on the slope.

In areas where the slope is more than 30 percent, the kind of equipment that can be used for forest management is limited. Proper design of road drainage systems and proper placement of culverts

help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. In areas where the slope is 50 percent or more, the use of wheeled and tracked equipment in skidding operations is limited. End lining generally causes less disturbance of the soil. The use of equipment should be avoided during periods when the soils are moist. Using equipment during these periods results in surface compaction, reduces pore space, decreases aeration, reduces porosity, reduces the rate of water infiltration, and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles with rubber tires. Plant competition delays natural regeneration but does not prevent the development of a fully stocked, normal stand of trees.

6. Loveness-Hunsinger-Lava Flows

Lava flows and deep and very deep, gently sloping to steep, well drained soils

This map unit is dominantly in the lower forested areas surrounding the valleys, in areas of lower rainfall. The soils formed in material derived from extrusive igneous rock and tephra. Elevation ranges from 3,100 feet in the Fall River Valley area to 5,000 feet in the Loveness area. The average annual precipitation is 16 to 25 inches, and the average annual temperature is 45 to 48 degrees F. The average frost-free period is 80 to 120 days. Slopes range from 2 to 50 percent.

This unit makes up about 18 percent of the survey area. It is 33 percent Loveness and similar soils, such as Burney, Chirpchatter, and Chatterdown soils; 25 percent Hunsinger and similar soils, such as Fleener soils; 21 percent Lava flows; and 21 percent components of minor extent. The minor components are Dotta and Esperanza soils on stream terraces; Britton soils on dissected lacustrine terraces; Arkright, Gooval, Jahjo, and Longbell soils on lava plateaus; Gassaway soils on lava plateaus and lava ridges; Bollibokka and Coneward soils on lava plateaus and hills; Neer soils on lava plateaus and mountains; and cinder mines.

Loveness soils are very deep and are well drained. They are on lava plateaus and hills. Slopes range from 2 to 30 percent. The surface layer is sandy loam. The subsurface layer is loam. The subsoil is gravelly loam and gravelly clay loam in the upper part and extremely stony clay loam in the lower part.

Hunsinger soils are deep and well drained. They are on lava plateaus, hills, and mountains. Slopes range from 2 to 50 percent. The surface layer is gravelly sandy loam. The subsoil is very cobbly sandy clay loam. It is underlain by basalt.

Lava flows are areas of jagged and broken lava, mainly basalt. These areas support sparse vegetation (fig. 3).

Areas of this unit are used mainly for timber production or homesite development. The Lava flows are not suited to timber production and may cause access problems for forest management. They provide areas of wildlife habitat. Rock fragments on the surface can interfere with the use of equipment for felling, yarding, and other operations. They may limit the choice of mechanized planting equipment. Also, high soil temperatures in the summer, especially on south- and southwest-facing slopes, can result in high seedling mortality rates.

If this unit is used for homesite development, the slope, large stones, the shrink-swell potential, and restricted permeability should be considered. During and after construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall. The large stones may block the excavation of trenches for the foundation. Shrinking and swelling can be overcome by using proper engineering designs or backfilling with material that has a low shrink-swell potential. The slope is a concern affecting septic tank systems. Installing the lines on the contour helps to meet drainage requirements. The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the absorption field and using a specially designed system help to overcome the restricted permeability. If the density of homesites increases, a community disposal system should be considered.

7. Jimmerson-Gasper-Scarface

Very deep, gently sloping to steep, well drained soils on lava plateaus and hills

This map unit is dominantly in the forested areas that have moderate rainfall. The soils formed in material derived from extrusive igneous rock and tephra. Elevation ranges from 3,000 to 5,100 feet. The average annual precipitation is 25 to 50 inches, and the average annual temperature is 45 to 50 degrees F. The average frost-free period is 80 to 100 days. Slopes range from 2 to 50 percent.

This unit makes up about 14 percent of the survey area. It is 30 percent Jimmerson and similar soils, 24 percent Gasper and similar soils, 22 percent Scarface and similar soils, and 24 percent components of minor extent. The minor components are Winnibulli soils on fan terraces; Boardburn and Quaking soils on lava plateaus; Kephart soils on lava plateaus and escarpments; Carberry, Depner, and

Figure 3.—The edge of a recent lava flow covering the Kephart soils in the Medicine Lake Highland area. This lava flow is typical of the material forming the lava plateaus throughout the survey area. Many of the skeletal soils in the area were formed when fine-earth material, dominantly ash, filled in between the rock fragments.

Hambone soils on lava plateaus and hills; and dumps, lava flows, and pits.

Typically, the surface layer of the Jimmerson soils is loam. The subsoil is clay loam in the upper part and cobbly clay loam in the lower part.

Typically, the surface layer and subsurface layer of the Gasper soils are gravelly sandy loam. The subsoil is very cobbly and extremely stony sandy loam in the upper part and very cobbly sandy clay loam in the lower part.

Typically, the surface layer and subsurface layer of the Scarface soils are sandy loam. They are underlain by gravelly sandy clay loam and gravelly clay loam.

Areas of this unit are used mainly for timber production. A few areas are used for homesite development. The main limitation affecting timber production is the slope. If these soils are used for homesite development, the slope, large stones, the shrink-swell potential, and restricted permeability should be considered. During and after construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall. The large stones may block the excavation of trenches for the foundation. The shrinking and swelling can be overcome by using proper engineering designs or backfilling with material that has a low shrink-swell potential. If septic tanks are used in steep areas, installing the leach lines on the contour helps to meet drainage requirements. The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the absorption field and using a specially designed system help to overcome the restricted

permeability. If the density of homesites increases, a community disposal system should be considered.

8. Neuns-Ponto-Neer

Moderately deep to very deep, gently sloping to very steep, well drained soils

This map unit is dominantly in the McCloud area. It has the highest rainfall of the soils in this group. The soils formed in outwash and material derived from extrusive igneous rocks and metamorphic rocks. Elevation ranges from 2,500 to 5,000 feet. The average annual precipitation is 30 to 60 inches, and the average annual temperature is 45 to 50 degrees F. The average frost-free period is 80 to 130 days. Slopes range from 2 to 75 percent.

This unit makes up about 12 percent of the survey area. It is 35 percent Neuns and similar soils, such as Kindig soils; 18 percent Ponto and similar soils; 17 percent Neer and similar soils, such as Nikal soils; and 30 percent components of minor extent. The minor components are Wyntoon soils on fan terraces, Shasta and Shastina soils on glacial outwash plains and fan terraces, Chatterdown soils on lava plateaus, Depner soils on lava plateaus and hills, Kettlebelly and Kilarc soils on mountains, Etsel soils on shoulders and ridges of mountains, Xerorthents on mountain back slopes and escarpments, and lava flows and rubble land.

Neuns soils are moderately deep. They are on mountains. Slopes range from 15 to 75 percent. The surface layer is gravelly sandy loam. The subsoil is very gravelly sandy loam in the upper part and very gravelly loam in the lower part. It is underlain by shale.

Ponto soils are very deep. They are on fan terraces, stream terraces, lava plateaus, hills, and mountains. Slopes range from 2 to 50 percent. The soils are sandy loam throughout.

Neer soils are moderately deep. They are on lava plateaus and mountains. Slopes range from 2 to 75 percent. The surface layer is gravelly sandy loam. The subsoil is very gravelly sandy loam. It is underlain by weathered vesicular andesite.

Areas of this unit are used mainly for timber production. Some areas of the Ponto and Neer soils are used for homesite development. The main limitations are the slope, the moderate depth to rock, the very gravelly subsoil, and very low or low available water capacity. Because of the depth to bedrock, disturbances should be kept to a minimum in areas of the Neer soils. In areas of deeper soils, reforestation can be accomplished by proper site preparation. Roads should be graveled or surfaced for all-weather use. If the subsoil of the Neuns soils is exposed, rooting depth and plant growth are reduced. Special site preparation may be necessary. The limited available water capacity in the upper 24 inches of the Neuns soils reduces the seedling survival rate.

If these soils are used for homesite development, the slope, the depth to rock, and coarse textures in the profile should be considered. During and after construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall. If septic tanks are used in the steeper areas, installing the leach lines on the contour helps to meet drainage requirements. The soils contain material that has a poor filtering capacity. This material is too coarse for a septic system. If the water table is too close to the septic system leach lines, the effluent may contaminate well water. If the density of homesites increases, a community disposal system should be considered.

Frigid Soils on Mountains With Strong Volcanic Influence

The soils in this group are dominantly on the higher positions on the landscape and have cooler soil temperatures. The surface layer and part of the subsurface layer or subsoil have identifiable ash from past volcanic events. The soils are used mainly for timber production. Some areas are used for homesite development. The length of time during which the surface is covered with snow restricts timber harvesting to late spring and early winter. This group makes up about 14 percent of the survey area.

9. Gosch-Witcher-Trojan

Deep, gently sloping to steep, well drained soils

This map unit dominantly has the lowest rainfall of the soils in this group. The soils formed in tephra and extrusive igneous rocks. Elevation ranges from 4,600 to 6,500 feet. The average annual precipitation is 18 to 25 inches, and the average annual temperature is 39 to 45 degrees F. The average frost-free season is 50 to 80 days. Slopes range from 2 to 50 percent.

This unit makes up about 3 percent of the survey area. It is 40 percent Gosch and similar soils, 38 percent Witcher and similar soils, 13 percent Trojan and similar soils, and 9 percent soils of minor extent. The minor soils are Sweagert soils on terraces and Erig and Ricketts soils on hills.

Gosch soils are on mountains. Slopes range from 2 to 50 percent. The surface layer is gravelly sandy loam. The subsurface layer is extremely stony sandy loam. The subsoil is extremely stony sandy clay loam

and extremely stony clay loam in the upper part and extremely gravelly clay loam in the lower part. It is underlain by andesite.

Witcher soils are on mountains. Slopes range from 2 to 50 percent. The surface layer is sandy loam. The subsoil is sandy clay loam in the upper part and very gravelly clay loam in the lower part. It is underlain by andesite.

Trojan soils are on mountains and hills. Slopes range from 15 to 30 percent. The surface layer is loam. The subsurface layer is cobbly loam. The subsoil is gravelly clay loam and extremely gravelly clay loam. It is underlain by tuff.

Areas of this unit are used mainly for timber production or homesite development. The main management concerns are the slope, moderately slow permeability, and a low available water capacity in the Gosch soils. Other concerns are plant competition, surface compaction, and a severe hazard of erosion. If these soils are used for homesite development, the slope and the moderately slow permeability should be considered. During and after construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during rainy periods. If septic tanks are used in the steeper areas, installing the leach lines on the contour helps to meet drainage requirements. The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the absorption field and using a specially designed system help to overcome the restricted permeability. If the density of homesites increases, a community disposal system should be considered.

10. Rivalier-Tionesta-Blankout

Moderately deep and very deep, gently sloping to very steep, well drained soils

This map unit is dominantly in areas that have moderate rainfall. The soils formed in material derived from tephra. Elevation ranges from 4,300 to 6,300 feet. The average annual precipitation is 25 to 35 inches, and the average annual temperature is 39 to 45 degrees F. The average frost-free season is 50 to 80 days. Slopes range from 2 to 75 percent.

This unit makes up about 2 percent of the survey area. It is 47 percent Rivalier and similar soils, 19 percent Tionesta and similar soils, 12 percent Blankout and similar soils, and 22 percent soils of minor extent. The minor soils are Medici and Medlake soils on hills and Roundbarn and Said soils on mountains.

Rivalier soils are moderately deep. They are on mountains. Slopes range from 15 to 75 percent. These soils are very gravelly and extremely gravelly sandy loam underlain by tuff.

Tionesta soils are very deep. They are on hills. Slopes range from 2 to 30 percent. These soils are pumiceous material of very gravelly loam coarse sand. They are underlain by gravelly coarse sandy loam, extremely gravelly coarse sandy loam, and extremely gravelly loamy coarse sand.

Blankout soils are very deep. They are on hills. Slopes range from 2 to 30 percent. The surface layer is coarse sandy loam. The subsoil is gravelly coarse sandy loam. It is underlain by extremely gravelly coarse sandy loam.

Areas of this unit are used mainly for timber production. Management concerns include the moderate depth to rock, the pumiceous material, and the hazard of fire damage. The extremely porous nature of the pumiceous material in the Tionesta and Blankout soils allows maximum root development for seedlings and tree growth. Water bars constructed with pumice can wash out during periods of intense thunderstorms, resulting in severe road erosion. The water bars should be constructed with mineral soil material, or roads should be built with rolled grades for erosion control. Because of the depth to bedrock, disturbances should be kept to a minimum in areas of the Rivalier soils. In areas of very deep soils, reforestation can be accomplished by proper site preparation. Fire can damage the soil by killing beneficial micro-organisms and reducing the content of organic matter. Careful planning is needed before any site preparation that involves burning is used.

11. Obie-Goulder-Mounthat

Moderately deep to very deep, gently sloping to very steep, well drained soils

This map unit has the highest rainfall of the soils in this group. The soils formed in debris flow and tephra derived from extrusive igneous rock. Elevation ranges from 2,500 feet in the McCloud area to 6,800 feet in the Burney Mountain area. The average annual precipitation is 30 to 60 inches, and the average annual temperature is 39 to 44 degrees F. The average frost-free season is 50 to 80 days. Slopes range from 2 to 75 percent.

This unit makes up about 9 percent of the survey area. It is 33 percent Obie and similar soils, such as Carberry soils; 24 percent Goulder and similar soils, such as Bundora soils; 18 percent Mounthat and similar soils, such as Revit soils; and 25 percent components of minor extent. The minor components are Dekkas soils on outwash plains between basaltic lava flows; Twinbuttes soils on cindercones and in

pockets between lava flows; Wengler soils on lava plateaus and hills; Typic Vitrixerands and Danhunt, Stacher, and Zeugirdor soils on mountains; and gullied land, rock outcrop, and rubble land.

Obie soils are deep. Slopes range from 5 to 50 percent. These soils are very gravelly sandy loam throughout. They are underlain by andesite.

Goulder soils are very deep. Slopes range from 2 to 50 percent. The surface layer is gravelly sandy loam. The subsurface layer is cobbly sandy loam. The subsoil is very cobbly and very gravelly clay loam in the upper part and very bouldery clay loam in the lower part.

Mounthat soils are moderately deep. Slopes range from 5 to 75 percent. The surface layer is gravelly sandy loam. Below this is very cobbly sandy loam underlain by andesite.

Areas of this unit are used mainly for timber production. Management concerns include depth to rock and the hazard of fire damage. Because of the limited depth to rock, disturbances should be kept to a minimum in areas of the Mounthat soils. In areas of deep and very deep soils, reforestation can be accomplished by proper site preparation. Fire can damage the soil by killing beneficial micro-organisms and reducing the content of organic matter. Careful planning is needed before any site preparation that involves burning is used.

Cryic Soils on Mountains With Strong Volcanic Influence

The soils in this group are dominantly in the highest positions on the landscape. Typically, the surface layer or part of the subsurface layer or subsoil, or both, have identifiable ash from a recent volcanic event. The major soils in this group have major limitations affecting timber production because of the long season during which snow is on the ground. This group makes up about 2 percent of the survey area.

12. Canyoncreek-Hermit

Deep, gently sloping to steep, well drained soils

This map unit is dominantly in the Cal Pines area at the highest elevations. It has the coolest soil temperatures. The soils formed in tephra. Elevation ranges from 6,000 to 7,100 feet. The average annual precipitation is about 20 to 25 inches, and the average annual temperature is about 38 to 43 degrees F. The average frost-free season ranges from about 40 to 50 days. Slopes range from 2 to 50 percent.

This unit is 51 percent Canyoncreek and similar soils and 49 percent Hermit and similar soils.

Typically, the surface layer of the Canyoncreek soils is sandy loam. The subsoil is very stony loam and extremely gravelly loam. It is underlain by tuff.

Typically, the surface layer of the Hermit soils is sandy loam. The subsoil is sandy loam in the upper part and very gravelly sandy loam in the lower part. It is underlain by tuff.

The soils in this unit are used mainly for timber production. A few areas are used for summer homes. The length of time that the snow remains on the ground severely limits timber harvesting and access to summer homes. Other concerns affecting timber production are surface compaction, plant competition, and the hazard of water erosion. The use of heavy equipment should be avoided during periods when the soils are moist. Using equipment during these periods results in surface compaction, reduces pore space, decreases aeration, reduces porosity, reduces the rate of water infiltration, and increases the runoff rate. Tracked vehicles tend to cause less compaction than vehicles with rubber tires. Maintaining a cover of vegetation, such as stumps and limbs, on 20 to 80 percent of the surface helps to control erosion during intense rainfall and spring snowmelt. The amount of surface cover needed depends on the slope. Plant competition delays natural regeneration but does not prevent the development of a fully stocked, normal stand of trees.

If these soils are used for homesite development, the slope, depth to rock, large stones, and restricted permeability should be considered. During and after construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall. The large stones on the Canyoncreek soils may prevent the excavations of trenches for the foundation. If septic tanks are used in steep areas, installing the leach lines on the contour helps to meet drainage requirements. The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the absorption field and using a specially designed system help to overcome the restricted permeability. If the density of homesites increases, a community disposal system should be considered.

Detailed Soil Map Units

The map units delineated on the detailed soil maps represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is given under the heading “Use and Management of the Soils.”

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some “included” areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit descriptions. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Dotta sandy loam, 2 to 5 percent slopes, is a phase of the Dotta series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes or associations.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Dudgen-Graven complex, 0 to 5 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Badenaugh-Matquaw association, 2 to 15 percent slopes, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rubble land is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see “Contents”) give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas. Appendix D lists the criteria for ratings of the hazard of erosion.

101—Adinot very gravelly sandy loam, 2 to 15 percent slopes

Setting

Landform: Pediments
Elevation: 4,200 to 4,400 feet
Slope range: 2 to 15 percent
Vegetation: Low sagebrush and grasses
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 100 to 120 days

Composition

Adinot and similar soils: 80 percent
Contrasting inclusions: 20 percent

Characteristics of the Adinot Soil

Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
0 to 2 inches—grayish brown very gravelly sandy loam
2 to 11 inches—brown gravelly loam and gravelly clay loam
11 to 14 inches—brown very gravelly clay loam
14 inches—tuff
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to bedrock: 14 to 20 inches
Water table: At the surface to 12 inches below the surface from December through March
Kind of water table: Perched
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

- Bieber soils, which are less than 20 inches deep to a hardpan and have more than 35 percent clay in the subsoil; on toe slopes
- Daphnedale soils, which are 20 to 40 inches deep to weathered bedrock and have more than 35 percent clay in the subsoil; on foot slopes
- Deven soils, which are 20 to 40 inches deep to hard bedrock and have more than 35 percent clay in the subsoil; on foot slopes
- Dotta soils, which are more than 60 inches deep; on toe slopes
- Soils that are less than 14 inches deep to bedrock; on shoulders

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants: Low sagebrush, bottlebrush squirreltail, needlegrass
Major management factors: Depth to rock, high water table, limited available water capacity
Management considerations:
- Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
- Fence construction on shallow soils requires special design.
- The high water table saturates the soil in the winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
- The high water table limits the choice of plant species that can be used for seeding. Frequency, intensity, and duration of grazing affect the composition of the plant community.
- Because of the limited available water capacity, intensive grazing management is needed.

Interpretive Groups

Land capability classification: VIIs, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Shallow Gravelly Loam, MAP 14-16 (21e)

102—Adinot very cobbly sandy loam, 2 to 15 percent slopes

Setting

Landform: Hills and pediments
Elevation: 4,000 to 5,000 feet
Slope range: 2 to 15 percent
Vegetation: Low sagebrush and grasses
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 100 to 120 days

Composition

Adinot and similar soils: 80 percent
Contrasting inclusions: 20 percent

Characteristics of the Adinot Soil

Important surface feature: 20 to 40 percent of the surface is covered with cobbles and stones.
Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
0 to 2 inches—brown very cobbly sandy loam
2 to 6 inches—brown loam
6 to 15 inches—brown clay loam
15 inches—tuff
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to bedrock: 14 to 20 inches
Water table: At the surface to 12 inches below the surface from December through March
Kind of water table: Perched
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Daphnedale soils, which are 20 to 40 inches deep to weathered bedrock and have more than 35 percent clay in the subsoil; on toe slopes
• Deven soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent clay in the subsoil; on toe slopes
• Oxendine soils, which are less than 20 inches deep to a hardpan over hard bedrock; in intermounds
• Soils that are less than 14 inches deep to bedrock; on foot slopes
• Sweagert soils, which are 20 to 40 inches deep to hard bedrock and have less than 35 percent clay in the subsoil; on mounds

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants: Low sagebrush, Thurber needlegrass, bluebunch wheatgrass
Major management factors: Depth to rock, high water table, rock fragments, limited available water capacity
Management considerations:
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• The high water table saturates the soil in the winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: VIIs, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Shallow Cobbly Loam, MAP 14-16 (21e)

103—Adinot very cobbly sandy loam, 15 to 30 percent slopes

Setting

Landform: Hills
Elevation: 4,000 to 5,000 feet
Slope range: 15 to 30 percent
Vegetation: Low sagebrush and grasses
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 100 to 120 days

Composition

Adinot and similar soils: 80 percent
Contrasting inclusions: 20 percent

Characteristics of the Adinot Soil

Important surface feature: 20 to 40 percent of the surface is covered with cobbles and stones.

Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
0 to 2 inches—brown very cobbly sandy loam
2 to 6 inches—brown loam
6 to 15 inches—brown clay loam
15 inches—tuff
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: 14 to 20 inches
Water table: At the surface to 12 inches below the surface from December through March
Kind of water table: Perched
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Daphnedale soils, which are 20 to 40 inches deep to weathered bedrock and have more than 35 percent clay in the subsoil; on foot slopes
• Deven soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent clay in the subsoil; on toe slopes
• Dotta soils, which are more than 60 inches deep; on toe slopes
• Soils that are less than 14 inches deep to hard bedrock; on shoulders
• Soils that have more than 35 percent rock fragments in the profile; on foot slopes
• Outcrops of tuff; on shoulders

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants: Low sagebrush, Thurber needlegrass, bluebunch wheatgrass
Major management factors: Water erosion, depth to rock, high water table, rock fragments, frost heaving, limited available water capacity
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• The high water table saturates the soil in the winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.
• Frost heaving forces bunchgrasses and sagebrush above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.
• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.

Interpretive Groups

Land capability classification: VIIs, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Shallow Cobbly Loam, MAP 14-16 (21e)

104—Adinot very stony sandy loam, 2 to 15 percent slopes

Setting

Landform: Summits
Elevation: 4,000 to 5,000 feet
Slope range: 2 to 15 percent
Vegetation: Low sagebrush and grasses
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 100 to 120 days

Composition

Adinot and similar soils: 80 percent
Contrasting inclusions: 20 percent

Characteristics of the Adinot Soil

Important surface feature: About 20 to 40 percent of the surface is covered with stones and cobbles.
Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
0 to 2 inches—brown very stony sandy loam
2 to 5 inches—brown gravelly loam
5 to 15 inches—brown gravelly clay loam
15 inches—tuff
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Moderately slow

Available water capacity: Very low
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to bedrock: 14 to 20 inches
Water table: At the surface to 12 inches below the surface from December through March
Kind of water table: Perched
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Deven soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent clay in the subsoil; on toe slopes
• Soils that are less than 14 inches deep to bedrock; on shoulders
• Soils that are more than 20 inches deep to bedrock; on toe slopes
• Soils that have more than 35 percent rock fragments throughout; on escarpments
• Outcrops of tuff; on escarpments

Use and Management

Land use: Livestock grazing or homesite development

Livestock grazing

Common plants: Low sagebrush, Thurber needlegrass, bluebunch wheatgrass
Major management factors: Depth to rock, high water table, rock fragments, frost heaving, limited available water capacity
Management considerations:
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• The high water table saturates the soil in the winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
• The high water table limits the choice of plant species that can be used for seeding. Frequency, intensity, and duration of grazing affect the composition of the plant community.
• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Frost heaving forces bunchgrasses and sagebrush above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.
• Because of the limited available water capacity, forage plants should not be stressed too frequently or severely during the growing season.
• Maintaining a cover of vegetation, such as grass and brush, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.

Homesite development

Major management factors: Depth to rock
Management considerations:
• The bedrock can make a good base for the foundation.
• Frequent irrigation cycles and controlled application rates are needed to maintain vegetation.
• The limited depth to rock inhibits the filtering capacity of the leach fields or can prevent their placement. If the leach lines are placed too close to the bedrock, ground water may be contaminated by the effluent.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: VIIs, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Shallow Cobbly Loam, MAP 14-16 (21e)

105—Adinot-Adinot, eroded, complex, 2 to 15 percent slopes

Setting

Landform: Pediments
Elevation: 4,350 to 4,400 feet
Slope range: 2 to 15 percent
Vegetation: Grasses and low sagebrush
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 100 to 120 days

Composition

Adinot and similar soils: 50 percent
Eroded Adinot soil and similar soils: 30 percent
Contrasting inclusions: 20 percent

Characteristics of the Adinot Soil

Position on the landscape: Foot slopes
Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
0 to 2 inches—grayish brown very gravelly sandy loam

2 to 11 inches—brown gravelly loam and brown gravelly clay loam
11 to 14 inches—brown very gravelly clay loam
14 inches—tuff
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to bedrock: 14 to 20 inches
Water table: At the surface to 12 inches below the surface from December through March
Kind of water table: Perched
Hazard of water erosion in bare areas: Moderate

Characteristics of the Eroded Adinot Soil

Position on the landscape: Back slopes and shoulders
Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
0 to 2 inches—light brownish gray very gravelly sandy loam
2 to 8 inches—light brownish gray loam
8 inches—hard conglomerate tuff
Depth class: Very shallow
Drainage class: Moderately well drained
Slowest permeability class: Moderate
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: 4 to 10 inches
Water table: At the surface to 12 inches below the surface from December through March
Kind of water table: Perched
Hazard of water erosion in bare areas: High

Contrasting Inclusions

• Cuppy soils, which are 20 to 40 inches deep to a hardpan and have more than 35 percent clay throughout; in intermounds
• Daphnedale soils, which are 20 to 40 inches deep to weathered bedrock and have more than 35 percent clay in the subsoil; on foot slopes
• Deven soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent clay in the subsoil; on toe slopes and shoulders
• Oxendine soils, which are less than 20 inches deep to a hardpan over weathered bedrock; in intermounds
• Sweagert soils, which are 20 to 40 inches deep to a hardpan; on toe slopes

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants on the Adinot soil: Low sagebrush, bottlebrush squirreltail, needlegrass
Common plants on the eroded Adinot soil: Sandberg bluegrass, bottlebrush squirreltail, Wright buckwheat, low sagebrush
Major management factors: Water erosion, depth to rock, perched water table, limited available water capacity
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• The perched water table results in saturated soil conditions in winter and early spring. Equipment use and livestock trampling during these periods can damage the soil and vegetation.
• The high water table limits the choice of plant species that can be used for seeding. Frequency, intensity, and duration of grazing affect the composition of the plant community.
• Because of the limited available water capacity, intensive grazing management is needed.

Interpretive Groups

Land capability classification: VIIs, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Adinot—Shallow Gravelly Loam, MAP 14-16 (21e); Adinot, eroded—Eroded Shallow Gravelly Loam, MAP 14-16 (21e)

106—Badenaugh-Matquaw association, 2 to 15 percent slopes

Setting

Landform: Stream terraces
Elevation: 4,000 to 4,800 feet
Slope range: 2 to 15 percent
Vegetation: Sagebrush and grasses
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 49 degrees F

Mean annual soil temperature: 49 to 51 degrees F
Frost-free period: 80 to 100 days

Composition

Badenaugh and similar soils: 45 percent
Matquaw and similar soils: 30 percent
Contrasting inclusions: 25 percent

Characteristics of the Badenaugh Soil

Position on the landscape: Foot slopes
Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 3 inches—brown very gravelly sandy loam
3 to 45 inches—brown and dark yellowish brown very cobbly sandy clay loam
45 to 60 inches—stratified light brown extremely gravelly sandy loam to strong brown very cobbly sandy clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of soil blowing in bare areas: Low

Characteristics of the Matquaw Soil

Position on the landscape: Side slopes
Parent material: Slope alluvium from pumiceous tuff
Typical profile:
0 to 12 inches—grayish brown sandy loam
12 to 33 inches—brown and yellowish brown sandy loam
33 to 45 inches—yellowish brown gravelly sandy loam
45 to 60 inches—yellowish brown extremely cobbly sandy loam
60 inches—pumiceous tuff
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: 60 inches or more
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Jellycamp soils, which are less than 20 inches deep to a hardpan over hard bedrock; on toe slopes
• Ravendale soils, which are 40 to 60 inches deep to a hardpan; on toe slopes
• Soils that are similar to the Badenaugh soil but have less than 35 percent rock fragments in the profile; on toe slopes

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants: Mountain big sagebrush, Indian ricegrass, rubber rabbitbrush, Thurber needlegrass
Major management factors: Badenaugh—no major management concerns; Matquaw—water erosion
Management considerations:
• If the soil is grazed to a bare condition, the loss of the surface layer by water erosion severely reduces productivity and the potential to produce vegetation suitable for grazing.
• Maintaining a cover of vegetation, such as grass and brush, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.

Interpretive Groups

Land capability classification: Badenaugh—IVs-4, nonirrigated; Matquaw—IVe-4, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Badenaugh and Matquaw—Sandy Loam, MAP 14-16 (21e)

107—Bieber-Esperanza complex, 0 to 2 percent slopes

Setting

Landform: Stream terraces
Elevation: 4,000 to 4,500 feet
Slope range: 0 to 2 percent
Vegetation: Low sagebrush and grasses
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 50 to 52 degrees F
Frost-free period: 100 to 120 days

Composition

Bieber and similar soils: 50 percent
Esperanza and similar soils: 30 percent
Contrasting inclusions: 20 percent

Characteristics of the Bieber Soil

Position on the landscape: Mounds
Parent material: Alluvium from extrusive igneous rock and lake sediments

Typical profile:
0 to 5 inches—yellowish brown and brown sandy loam
5 to 11 inches—brown clay loam
11 to 17 inches—light brown clay
17 to 33 inches—hardpan
33 to 60 inches—reddish yellow, stratified, cemented very gravelly sandy loam
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Very slow
Available water capacity: Low
Highest shrink-swell potential: High
Surface runoff: Very slow or slow
Depth to claypan: 5 to 10 inches
Depth to hardpan: 8 to 20 inches
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Esperanza Soil

Position on the landscape: Toe slopes
Parent material: Alluvium from tuff, basalt, and diatomite
Typical profile:
0 to 5 inches—dark grayish brown loam
5 to 30 inches—dark grayish brown and dark brown clay loam and clay
30 to 53 inches—brown clay loam
53 to 61 inches—hardpan
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: High
Highest shrink-swell potential: High
Surface runoff: Very slow
Depth to claypan: 10 to 20 inches
Depth to hardpan: 40 to 60 inches
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Modoc soils, which are 20 to 40 inches deep to a hardpan and have less than 35 percent clay in the subsoil; on mounds
• Pit soils, which are more than 60 inches deep and are clay throughout; in intermounds
• Pittville soils, which are more than 60 inches deep and have less than 35 percent clay in the subsoil; on foot slopes

Use and Management

Land use: Irrigated crops or livestock grazing

Irrigated crops

Common crops: Alfalfa, grass-legume hay, barley, and wheat
Major management factors: Bieber—depth to the claypan, cemented pan, very slow permeability; Esperanza—depth to the claypan, slow permeability
Management considerations:
• Chiseling or subsoiling of the claypan can provide temporary benefits from improved water and air movement and root penetration.
• Applying irrigation water slowly but for longer periods helps to prevent oxygen depletion in the surface horizons.
• On soils that have a cemented pan, intensive management of irrigation water is needed to prevent the buildup of a perched water table. Ripping or subsoiling can permanently enhance the root environment.
• Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.

Livestock grazing

Common plants on the Bieber soil: Low sagebrush, Wright buckwheat, bottlebrush squirreltail, Sandberg bluegrass
Common plants on the Esperanza soil: Low sagebrush, beardless wildrye, rubber rabbitbrush, antelope bitterbrush, Lemmon needlegrass
Major management factors: Bieber—cemented pan, frost heaving; Esperanza—no major management concerns
Management considerations:
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Frost heaving forces bunchgrasses and sagebrush above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.

Interpretive Groups

Land capability classification: Bieber—IVs-3, irrigated and nonirrigated; Esperanza—IIs-3, irrigated, and IIIs-3, nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland only in irrigated areas
Range site: Bieber—Shallow Loamy Intermounds,

MAP 14-16 (21e); Esperanza—Loamy Claypan, MAP 14-18 (21e)

108—Bieber-Modoc complex, 0 to 5 percent slopes

Setting

Landform: Stream terraces
Elevation: 4,100 to 4,500 feet
Slope range: 0 to 5 percent
Vegetation: Low sagebrush and grasses
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 50 to 52 degrees F
Frost-free period: 100 to 120 days

Composition

Bieber and similar soils: 50 percent
Modoc and similar soils: 30 percent
Contrasting inclusions: 20 percent

Characteristics of the Bieber Soil

Position on the landscape: Intermounds
Parent material: Alluvium from extrusive igneous rock and lacustrine sediments
Typical profile:
0 to 5 inches—grayish brown and yellowish brown gravelly sandy loam
5 to 11 inches—yellowish brown clay loam
11 to 19 inches—light yellowish brown clay
19 to 60 inches—hardpan
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Very slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Very slow or slow
Depth to claypan: 5 to 10 inches
Depth to hardpan: 10 to 20 inches
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Modoc Soil

Position on the landscape: Mounds
Parent material: Mixed alluvium from sedimentary and extrusive igneous rock
Typical profile:
0 to 3 inches—brown sandy loam
3 to 32 inches—brown, yellowish brown, and light yellowish brown sandy clay loam
32 to 60 inches—hardpan
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Moderate
Surface runoff: Slow
Depth to hardpan: 20 to 40 inches
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Adinot soils, which are less than 20 inches deep to hard bedrock and have less than 35 percent clay in the subsoil; on foot slopes
• Dotta soils, which are more than 60 inches deep and have less than 35 percent clay in the subsoil; on toe slopes
• Oxendine soils, which are less than 20 inches deep to a hardpan over weathered bedrock and have less than 35 percent clay in the subsoil; on foot slopes
• Sweagert soils, which are 20 to 40 inches deep to a hardpan; on foot slopes

Use and Management

Land use: Livestock grazing, irrigated crops, or homesite development

Livestock grazing

Common plants on the Bieber soil: Wright buckwheat, bottlebrush squirreltail, Sandberg bluegrass, low sagebrush
Common plants on the Modoc soil: Mountain big sagebrush, rubber rabbitbrush, basin wildrye, Lemmon needlegrass
Major management factors: Bieber—cemented pan, depth to the claypan, frost heaving, limited available water capacity; Modoc—soil blowing
Management considerations:
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• The claypan prevents water from moving through the profile rapidly. Wheeled equipment should not be used when the soil is saturated.
• Frost heaving forces bunchgrasses and sagebrush above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.
• Because of the limited available water capacity,

intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Irrigated crops

Common crops: Alfalfa, grass-legume hay, barley, and wheat
Major management factors: Bieber—slope, depth to the claypan, cemented pan, very slow permeability; Modoc—slope, soil blowing, cemented pan
Management considerations:
• Sprinkler irrigation is the most suitable method of applying water.
• Soil blowing can be controlled by keeping the soil rough, using emergency tillage, stripcropping, and establishing windbreaks.
• Chiseling or subsoiling of the claypan can provide temporary benefits from improved water and air movement and root penetration.
• Because of the restricted permeability, proper irrigation management is needed to prevent stand deterioration.
• On soils that have a cemented pan, intensive management of irrigation water is needed to prevent the buildup of a perched water table. Ripping or subsoiling can permanently enhance the root environment.
• Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.

Homesite development

Major management factors: Bieber and Modoc—cemented pan, shrink-swell, restricted permeability
Management considerations:
• The cemented pan can make a good base for the foundation.
• Using frequent irrigation cycles and controlled application rates helps to prevent a perched water table. If deep-rooted plants, such as trees, are planted, the cemented pan should be ripped or broken.
• The effects of shrinking and swelling can be minimized by using proper engineering designs or backfilling with material that has a low shrink-swell potential.
• The cemented pan reduces the volume of soil that is available for filtering effluent. Tests should be made below the pan depth to determine whether the lines should be placed at this depth.
• The restricted permeability decreases the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Bieber—VIe, irrigated and nonirrigated; Modoc—IIIe-8, irrigated, and VIe, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Bieber—Shallow Loamy Intermounds, MAP 14-16 (21e); Modoc—Loam, MAP 14-16 (21e)

109—Blankout-Medici complex, 2 to 15 percent slopes

Setting

Landform: Hills
Elevation: 4,300 to 5,400 feet
Slope range: 2 to 15 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 42 to 45 degrees F
Mean annual soil temperature: 40 to 47 degrees F
Frost-free period: 50 to 80 days

Composition

Blankout and similar soils: 45 percent
Medici and similar soils: 35 percent
Contrasting inclusions: 20 percent

Characteristics of the Blankout Soil

Position on the landscape: Foot slopes
Parent material: Tephra
Typical profile:
1 inch to 0—duff
0 to 18 inches—brown coarse sandy loam
18 to 62 inches—brown and strong brown gravelly coarse sandy loam
62 to 81 inches—brown extremely gravelly coarse sandy loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Medici Soil

Position on the landscape: Foot slopes
Parent material: Tephra
Typical profile:
2 inches to 0—duff
0 to 1 inch—grayish brown coarse sandy loam
1 to 19 inches—light gray and pink gravelly coarse sandy loam
19 to 51 inches—pink very gravelly coarse sandy loam
51 to 67 inches—pink very gravelly loam
67 to 75 inches—very pale brown, stratified coarse sand to loamy coarse sand
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

- Medlake soils, which are more than 60 inches deep and have pumiceous material over medial material; at the higher elevations on toe slopes
- Areas that have slopes of more than 15 percent
- Soils that are similar to the Medici soil but have bedrock at a depth of 40 to 60 inches; on back slopes
- Tionesta soils, which are more than 60 inches deep and have pumiceous material over medial-skeletal material; on toe slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Blankout soil

Main tree species: White fir, sugar pine, ponderosa pine, incense cedar
Mean site index for stated species: White fir—67; ponderosa pine—92
Dunning site class: 2
CACTOS site index: 45
Common understory plants: Greenleaf manzanita, squawcarpet, Sierra chinkapin, snowbrush ceanothus, antelope bitterbrush

Woodland vegetation on the Medici soil

Main tree species: White fir, sugar pine, ponderosa pine, incense cedar
Mean site index for stated species: White fir—75; ponderosa pine—89
Dunning site class: 2
CACTOS site index: 60
Common understory plants: Greenleaf manzanita, squawcarpet, antelope bitterbrush, snowbrush ceanothus, Sierra chinkapin

Timber production

Major management factors: Blankout—compaction hazard, plant competition; Medici—water erosion, compaction hazard, plant competition
Management considerations:
- Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 15 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- Roads and landings can be protected from erosion by constructing water bars.
- The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
- Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
- Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
- Trees suitable for planting include white fir, sugar pine, and ponderosa pine.

Interpretive Groups

Land capability classification: Blankout—IVe-4, nonirrigated; Medici—IVs-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Blankout and Medici—6S

110—Boardburn-Hambone complex, 5 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 4,000 to 4,500 feet
Slope range: 5 to 15 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 20 to 30 inches
Mean annual air temperature: 46 to 48 degrees F
Mean annual soil temperature: 48 to 49 degrees F
Frost-free period: 80 to 100 days

Composition

Boardburn and similar soils: 60 percent
Hambone and similar soils: 30 percent
Contrasting inclusions: 10 percent

Characteristics of the Boardburn Soil

Position on the landscape: Toe slopes
Parent material: Colluvium from extrusive igneous rock
Typical profile:
3 inches to 0—duff
0 to 9 inches—yellowish brown and brown sandy loam
9 to 22 inches—light brown loam
22 to 40 inches—light brown sandy clay loam
40 to 50 inches—reddish yellow very gravelly sandy clay loam
50 inches—weathered andesitic tuff
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Moderate
Surface runoff: Medium
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Hambone Soil

Position on the landscape: Foot slopes
Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
2 inches to 0—duff
0 to 8 inches—dark brown and brown gravelly sandy loam
8 to 22 inches—brown very gravelly sandy clay loam
22 to 45 inches—brown extremely cobbly sandy clay loam
45 inches—weathered tuff
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Low
Highest shrink-swell potential: Moderate
Surface runoff: Medium
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Chirpchatter soils, which are more than 60 inches deep and have less than 35 percent clay in the subsoil; on the lower toe slopes
• Rock outcrop
• Soils that are similar to the Hambone soil but are 20 to 40 inches deep to hard bedrock; on shoulders

Use and Management

Land use: Timber production

Woodland vegetation on the Boardburn soil

Main tree species: Ponderosa pine, incense cedar, California black oak, sugar pine, white fir
Mean site index for stated species: Ponderosa pine—71
Dunning site class: 4
CACTOS site index: 45
Common understory plants: Greenleaf manzanita, squawcarpet, Idaho fescue, princes pine

Woodland vegetation on the Hambone soil

Main tree species: Douglas-fir, ponderosa pine, white fir, incense cedar, sugar pine
Mean site index for stated species: Douglas-fir—89; ponderosa pine—75; white fir—51
Dunning site class: 3
CACTOS site index: 56
Common understory plants: Greenleaf manzanita, buckbrush, squawcarpet, mountainmahogany, Idaho fescue, lupine, bluegrass, western chokecherry, skunkbush sumac

Timber production

Major management factors: Boardburn—water erosion, compaction hazard, plant competition; Hambone—rock fragments, compaction hazard, limited available water capacity, plant competition, hazard of fire damage
Management considerations:
• Roads and landings can be protected from erosion by constructing water bars.
• The rock fragments in the profile hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.

• Maintenance of evenly distributed organic material, such as limbs and needles, improves productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir, sugar pine, ponderosa pine, and Douglas-fir.

Interpretive Groups

Land capability classification: Boardburn—IIIe-3, nonirrigated; Hambone—IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Boardburn—4A; Hambone—4F

111—Bollibokka loam, 2 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 3,500 to 5,000 feet
Slope range: 2 to 15 percent
Vegetation: Juniper, conifers, oak, and shrubs
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Bollibokka and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Bollibokka Soil

Parent material: Colluvium and residuum from tuffaceous sandstone
Typical profile:
0 to 5 inches—yellowish brown loam
5 to 9 inches—brown clay loam
9 to 15 inches—strong brown gravelly clay loam
15 inches—tuffaceous sandstone
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to bedrock: 10 to 20 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Longcreek soils, which have more than 35 percent clay and rock fragments in the subsoil; on slopes of less than 9 percent
• Pittville soils, which are more than 60 inches deep; near stream channels
• Soils that are 20 to 40 inches deep to bedrock; on toe slopes

Use and Management

Land use: Wood products or grazing

Woodland vegetation

Main woodland species: Ponderosa pine, Digger pine, California black oak, western juniper, Oregon white oak
Mean site index for stated species: Ponderosa pine—64
*Dunning site class:*4
CACTOS site index: 43
Common understory plants: Antelope bitterbrush, serviceberry, birchleaf mountainmahogany, skunkbush sumac, squirreltail

Wood products

Major management factors: Water erosion, depth to rock, compaction hazard, limited available water capacity
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The depth to rock and the limited available water capacity hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.

Woodland grazing

Major management factors: Water erosion, depth to rock, limited available water capacity
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent

of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 3D

112—Bollibokka loam, 30 to 50 percent slopes

Setting

Landform: Hills
Elevation: 3,500 to 5,000 feet
Slope range: 30 to 50 percent
Vegetation: Juniper, conifers, oak, and shrubs
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Bollibokka and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Bollibokka Soil

Parent material: Colluvium and residuum from tuffaceous sandstone
Typical profile:
0 to 5 inches—yellowish brown loam
5 to 9 inches—brown clay loam
9 to 15 inches—strong brown gravelly clay loam
15 inches—tuffaceous sandstone
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: 10 to 20 inches
Hazard of water erosion in bare areas: High or very high

Contrasting Inclusions

• Jellico soils, which are 20 to 40 inches deep to hard bedrock and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on back slopes
• Longcreek soils, which have more than 35 percent clay and rock fragments in the subsoil; near escarpments
• Splawn soils, which are 20 to 40 inches deep and have more than 35 percent clay and rock fragments in the subsoil; on foot slopes

Use and Management

Land use: Wood products or grazing

Woodland vegetation

Main woodland species: Ponderosa pine, Oregon white oak, western juniper, California black oak, Digger pine
Mean site index for stated species: Ponderosa pine—64
Dunning site class: 4
CACTOS site index: 43
Common understory plants: Antelope bitterbrush, serviceberry, birchleaf mountainmahogany, skunkbush sumac, squirreltail

Wood products

Major management factors: Water erosion, slope, depth to rock, compaction hazard, limited available water capacity
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• The slope limits the kinds of equipment that can be used for harvesting wood products.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The depth to rock and the limited available water capacity hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.

Woodland grazing

Major management factors: Water erosion, slope, depth to rock, limited available water capacity
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The slope can limit access by equipment and some kinds of livestock. Fencing, water development, and forage supplements can improve livestock distribution.
• If seeding is desired, broadcast methods should be considered.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 3R

113—Bollibokka loam, 50 to 75 percent slopes

Setting

Landform: Hills
Elevation: 3,200 to 4,400 feet
Slope range: 50 to 75 percent
Vegetation: Shrubs, grasses, and scattered conifers
Mean annual precipitation: 20 to 25 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Bollibokka and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Bollibokka Soil

Parent material: Colluvium and residuum from tuffaceous sandstone
Typical profile:
0 to 5 inches—yellowish brown loam
5 to 9 inches—brown clay loam
9 to 15 inches—strong brown gravelly clay loam
15 inches—tuffaceous sandstone
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Moderate
Surface runoff: Very rapid
Depth to bedrock: 10 to 20 inches
Hazard of water erosion in bare areas: Very high

Contrasting Inclusions

• Areas that have slopes of less than 50 percent
• Soils that have bedrock at a depth of 20 to 40 inches; on foot slopes

Use and Management

Land use: Wood products or grazing

Woodland vegetation

Main woodland species: Ponderosa pine, California black oak, Oregon white oak, western juniper, Digger pine
Mean site index for stated species: Ponderosa pine—64
Dunning site class: 4
CACTOS site index: 43
Common understory plants: Antelope bitterbrush, serviceberry, birchleaf mountainmahogany, skunkbush sumac, squirreltail

Wood products

Major management factors: Water erosion, slope, rapid runoff, depth to rock, compaction hazard, limited available water capacity, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Maintaining the understory vegetation is essential in controlling erosion.
• The slope limits the use of wheeled and tracked equipment for wood products, such as firewood and fence posts.
• The very rapid runoff rate causes severe erosion if water is allowed to concentrate in bare areas, such as trails or roads.
• The depth to rock hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The use of heavy equipment when the soil is moist

can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The limited available water capacity in the profile reduces the seedling survival rate.
• High summer soil temperatures and low soil moisture content result in a high seedling mortality rate, especially on south- and southwest-facing slopes.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.

Woodland grazing

Major management factors: Water erosion, slope, very rapid runoff, depth to rock, limited available water capacity
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The slope can limit access by equipment and some kinds of livestock. Fencing, water development, and forage supplements can improve livestock distribution.
• If seeding is desired, broadcast methods should be considered.
• The very rapid runoff rate causes severe erosion if water is allowed to concentrate in bare areas, such as cattle trails or roads.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: VIe, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 3R

114—Britton silty clay loam, 5 to 15 percent slopes

Setting

Landform: Dissected lacustrine terraces
Elevation: 2,700 to 3,000 feet
Slope range: 5 to 15 percent
Vegetation: Ponderosa pine, oak, shrubs, and grasses
Mean annual precipitation: 16 to 25 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Britton and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Britton Soil

Parent material: Slope alluvium from diatomaceous earth
Typical profile:
0 to 17 inches—gray silty clay loam
17 inches—soft diatomaceous earth
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to bedrock: 10 to 20 inches
Hazard of water erosion in bare areas: Moderate or high

Contrasting Inclusions

• Coneward soils, which are more than 60 inches deep and have sandy textures throughout; on shoulders and back slopes
• Lasvar soils, which are 20 to 40 inches deep and are clay throughout; on toe slopes
• Areas that have slopes of 15 to 30 percent
• Soils that are 20 to 40 inches deep; on toe slopes

Use and Management

Land use: Timber production or grazing

Woodland vegetation

Main tree species: Ponderosa pine, California black oak, Oregon white oak

Mean site index for stated species: Ponderosa pine—82
Dunning site class: 3
CACTOS site index: 53
Common understory plants: Skunkbush sumac, antelope bitterbrush, needlegrass, rose

Timber production

Major management factors: Water erosion, depth to rock, low strength, compaction hazard, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
• The depth to rock hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• This soil has low strength, and roads are slippery when wet.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include ponderosa pine.

Woodland grazing

Major management factors: Water erosion, surface crusting
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Surface crusting can greatly reduce the rate of water infiltration and hinder seedling emergence. Livestock can be used to break crusts. Maintaining a cover of vegetation minimizes surface crusting.

Interpretive Groups

Land capability classification: IVe-1, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 5D

115—Britton silty clay loam, 15 to 30 percent slopes

Setting

Landform: Dissected lacustrine terraces
Elevation: 2,700 to 3,000 feet
Slope range: 15 to 30 percent
Vegetation: Ponderosa pine, oak, shrubs, and grasses
Mean annual precipitation: 16 to 25 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Britton and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Britton Soil

Parent material: Slope alluvium from diatomaceous earth
Typical profile:
0 to 8 inches—gray silty clay loam
8 to 15 inches—gray gravelly silty clay loam
15 inches—soft diatomaceous earth
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: 10 to 20 inches
Hazard of water erosion in bare areas: High or very high

Contrasting Inclusions

- Coneward soils, which are more than 60 inches deep and have sandy textures throughout; on back slopes
- Soils that are 20 to 40 inches deep; on toe slopes
- Soils that do not have a clay increase; on back slopes and shoulders
- Areas that have slopes of 5 to 15 percent

Use and Management

Land use: Timber production or grazing

Woodland vegetation

Main tree species: Oregon white oak, ponderosa pine, California black oak
Mean site index for stated species: Ponderosa pine—82
Dunning site class: 3
CACTOS site index: 53
Common understory plants: Skunkbush sumac, antelope bitterbrush, needlegrass, rose

Timber production

Major management factors: Water erosion, depth to rock, low strength, compaction hazard, plant competition
Management considerations:
- Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
- Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
- The depth to rock hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
- This soil has low strength, and roads are slippery when wet.
- The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
- Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
- Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
- Trees suitable for planting include ponderosa pine.

Woodland grazing

Major management factors: Water erosion, depth to rock, surface crusting
Management considerations:
- Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
- Fence construction on shallow soils requires special design.
- Surface crusting can greatly reduce the water infiltration rate and hinder seedling emergence. Livestock can be used to break crusts. Maintaining a cover of vegetation minimizes surface crusting.

Interpretive Groups

Land capability classification: IVe-1, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 5D

116—Britton silty clay loam, 30 to 50 percent slopes

Setting

Landform: Dissected lacustrine terraces
Elevation: 2,700 to 3,200 feet
Slope range: 30 to 50 percent
Vegetation: Mixed conifers, oaks, and shrubs
Mean annual precipitation: 18 to 25 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Britton and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Britton Soil

Parent material: Slope alluvium from diatomite
Typical profile:
0 to 8inches—gray silty clay loam
8 to 15 inches—gray gravelly silty clay loam
15 inches—soft diatomite

Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: 10 to 20 inches
Hazard of water erosion in bare areas: High or very high

Contrasting Inclusions

- Neer soils, which are 20 to 40 inches deep to hard bedrock and have medial-skeletal material; on shoulders
- Areas that have slopes of 15 to 30 percent or 50 to 75 percent
- Soils that are 20 to 40 inches deep; on foot slopes
- Soils that do not have a clay increase; on back slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: Oregon white oak, ponderosa pine, California black oak
Mean site index for stated species: Ponderosa pine—82
Dunning site class: 3
CACTOS site index: 53
Common understory plants: Skunkbush sumac, antelope bitterbrush, needlegrass, rose

Timber production

Major management factors: Water erosion, slope, depth to rock, low strength, compaction hazard, plant competition
Management considerations:
- Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
- The slope limits the kinds of equipment that can be used in forest management.
- Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
- The depth to rock hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
- This soil has low strength, and roads are slippery when wet.
- The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
- Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
- Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
- Trees suitable for planting include ponderosa pine.

Interpretive Groups

Land capability classification: VIe, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 5R

117—Bundora-Goulder complex, 2 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 4,400 to 6,800 feet
Slope range: 2 to 15 percent
Vegetation: White fir, sugar pine, and shrubs
Mean annual precipitation: 30 to 50 inches
Mean annual air temperature: 39 to 44 degrees F
Mean annual soil temperature: 41 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Bundora and similar soils: 45 percent
Goulder and similar soils: 35 percent
Contrasting inclusions: 20 percent

Characteristics of the Bundora Soil

Position on the landscape: Foot slopes
Important surface feature: About 5 percent or less of the surface is covered with stones and cobbles.
Parent material: Slope alluvium from ash and tuff
Slope: 9 to 15 percent
Typical profile:
1 inch to 0—duff

0 to 14 inches—dark brown sandy loam
14 to 29 inches—brown sandy loam
29 to 63 inches—brown and grayish brown very gravelly loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Goulder Soil

Position on the landscape: Toe slopes
Parent material: Tephra over andesitic lava
Typical profile:
1 inch to 0—duff
0 to 7 inches—brown gravelly sandy loam
7 to 17 inches—brown cobbly sandy loam
17 to 27 inches—brown cobbly loam
27 to 41 inches—brown very cobbly clay loam
41 to 58 inches—brown very gravelly clay loam
58 to 64 inches—brown very bouldery clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Soils that are less than 60 inches deep; on foot slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Bundora soil

Main tree species: White fir, ponderosa pine, sugar pine
Mean site index for stated species: White fir—83
Dunning site class: 1A
CACTOS site index: 93
Common understory plants: Greenleaf manzanita, snowbrush ceanothus, Sierra chinkapin

Woodland vegetation on the Goulder soil

Main tree species: White fir, incense cedar, sugar pine, ponderosa pine, Douglas-fir, California black oak, California red fir
Mean site index for stated species: White fir—76
Dunning site class: 1
CACTOS site index: 85
Common understory plants: Greenleaf manzanita, Sierra chinkapin, snowbrush ceanothus, princes pine, brackenfern, gooseberry, snowberry, whitethorn ceanothus

Timber production

Major management factors: Bundora—water erosion, plant competition, hazard of fire damage; Goulder—water erosion, compaction hazard, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir and ponderosa pine.

Interpretive Groups

Land capability classification: Bundora—IVs-7, nonirrigated; Goulder—IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Bundora—14A; Goulder—13F

118—Bundora-Goulder complex, 15 to 30 percent slopes

Setting

Landform: Lava plateaus and mountains
Elevation: 2,500 to 5,000 feet
Slope range: 15 to 30 percent
Vegetation: White fir, sugar pine, and shrubs
Mean annual precipitation: 30 to 50 inches
Mean annual air temperature: 39 to 44 degrees F
Mean annual soil temperature: 41 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Bundora and similar soils: 45 percent
Goulder and similar soils: 35 percent
Contrasting inclusions: 20 percent

Characteristics of the Bundora Soil

Position on the landscape: Toe slopes
Important surface feature: About 5 percent or less of the surface is covered with stones and cobbles.
Parent material: Slope alluvium from ash and tuff
Typical profile:
1 inch to 0—duff
0 to 14 inches—dark brown sandy loam
14 to 29 inches—brown sandy loam
29 to 63 inches—brown and grayish brown very gravelly loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate

Characteristics of the Goulder Soil

Position on the landscape: Foot slopes
Parent material: Tephra over andesitic lava
Typical profile:
1 inch to 0—duff
0 to 7 inches—brown gravelly sandy loam
7 to 17 inches—brown cobbly sandy loam
17 to 27 inches—brown cobbly loam
27 to 41 inches—brown very cobbly clay loam
41 to 58 inches—brown very gravelly clay loam
58 to 64 inches—brown very bouldery clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

- Soils that are 40 to 60 inches deep; on side slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Bundora soil

Main tree species: White fir, sugar pine, ponderosa pine
Mean site index for stated species: White fir—83
Dunning site class: 1A
CACTOS site index: 93
Common understory plants: Greenleaf manzanita, Sierra chinkapin, snowbrush ceanothus

Woodland vegetation on the Goulder soil

Main tree species: White fir, incense cedar, California red fir, ponderosa pine, sugar pine, Douglas-fir, California black oak
Mean site index for stated species: White fir—76
Dunning site class: 1
CACTOS site index: 85
Common understory plants: Greenleaf manzanita, Sierra chinkapin, snowbrush ceanothus, princes pine, brackenfern, gooseberry, snowberry, whitethorn ceanothus

Timber production

Major management factors: Bundora—water erosion, plant competition, hazard of fire damage; Goulder—water erosion, compaction hazard, plant competition
Management considerations:
- Maintaining a cover of vegetation, such as stumps and limbs, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- Roads and landings can be protected from erosion by constructing water bars.
- Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
- The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.

• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir and ponderosa pine.

Interpretive Groups

Land capability classification: Bundora—IVs-7, nonirrigated; Goulder—IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Bundora—14A; Goulder—13F

119—Bundora-Goulder complex, 30 to 50 percent slopes

Setting

Landform: Mountains
Elevation: 4,400 to 6,800 feet
Slope range: 30 to 50 percent
Vegetation: White fir, sugar pine, and shrubs
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 39 to 44 degrees F
Mean annual soil temperature: 42 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Bundora and similar soils: 45 percent
Goulder and similar soils: 35 percent
Contrasting inclusions: 20 percent

Characteristics of the Bundora Soil

Position on the landscape: Side slopes
Important surface feature: About 5 to 10 percent of the surface is covered with stones and cobbles.
Parent material: Slope alluvium from ash and tuff
Typical profile:
1 inch to 0—duff
0 to 14 inches—dark brown sandy loam
14 to 29 inches—brown sandy loam
29 to 63 inches—brown and grayish brown very gravelly loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate or high

Characteristics of the Goulder Soil

Position on the landscape: Back slopes
Parent material: Tephra over andesitic lava
Typical profile:
1 inch to 0—duff
0 to 7 inches—brown gravelly sandy loam
7 to 17 inches—brown cobbly sandy loam
17 to 27 inches—brown cobbly loam
27 to 41 inches—brown very cobbly clay loam
41 to 58 inches—brown very gravelly clay loam
58 to 64 inches—brown very bouldery clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate or high

Contrasting Inclusions

• Soils that are less than 60 inches deep to weathered bedrock; on side slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Bundora soil

Main tree species: White fir, ponderosa pine, sugar pine
Mean site index for stated species: White fir—83
Dunning site class: 1A
CACTOS site index: 93
Common understory plants: Snowbrush ceanothus, greenleaf manzanita

Woodland vegetation on the Goulder soil

Main tree species: White fir, Douglas-fir, ponderosa pine, sugar pine, California red fir, California black oak, incense cedar
Mean site index for stated species: White fir—76
Dunning site class: 1
CACTOS site index: 85

Common understory plants: Greenleaf manzanita, Sierra chinkapin, snowbrush ceanothus, princes pine, brackenfern, gooseberry, snowberry, whitethorn ceanothus

Timber production

Major management factors: Bundora—water erosion, slope, plant competition, hazard of fire damage; Goulder—water erosion, slope, compaction hazard, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• The slope limits the kinds of equipment that can be used in forest management.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir and ponderosa pine.

Interpretive Groups

Land capability classification: Bundora—VIs, nonirrigated; Goulder—VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Bundora—14R; Goulder—13R

120—Bunselmeier very gravelly sandy loam, 15 to 30 percent slopes

Setting

Landform: Cindercones
Elevation: 3,200 to 5,000 feet
Slope range: 15 to 30 percent
Vegetation: Grasses, big sagebrush, and antelope bitterbrush
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Bunselmeier and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Bunselmeier Soil

Parent material: Cinders
Typical profile:
0 to 12 inches—brown very gravelly sandy loam
12 to 25 inches—brown and strong brown very gravelly sandy clay loam
25 to 48 inches—strong brown extremely gravelly sandy loam
48 to 62 inches—strong brown cinders
Depth class: Deep to cinders
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Slow to rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Cinderland
• Fiddler soils, which are 20 to 40 inches deep to hard bedrock; on toe slopes
• Jellycamp soils, which are less than 20 inches deep to a hardpan over hard bedrock; on toe slopes
• Ollierivas soils, which are 20 to 40 inches deep to a hardpan over hard bedrock; on foot slopes
• Whitinger soils, which are 20 to 40 inches deep to hard bedrock; on foot slopes

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants: Thurber needlegrass, antelope bitterbrush, mountain big sagebrush, Idaho fescue, bluebunch wheatgrass
Major management factors: Water erosion
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.

Interpretive Groups

Land capability classification: IVs-0, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Gravelly Loam, MAP 14-18 (21e)

121—Burman-Lasvar complex, 0 to 2 percent slopes

Setting

Landform: Fan terraces
Elevation: 3,100 to 4,800 feet
Slope range: 0 to 2 percent
Vegetation: Low sagebrush and grasses
Mean annual precipitation: 16 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 50 to 100 days

Composition

Burman and similar soils: 50 percent
Lasvar and similar soils: 35 percent
Contrasting inclusions: 15 percent

Characteristics of the Burman Soil

Position on the landscape: Foot slopes
Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 3 inches—grayish brown loam
3 to 7 inches—grayish brown clay loam
7 to 11 inches—gray clay loam
11 to 29 inches—light yellowish brown and yellowish brown clay
29 inches—hardpan
Depth class: Moderately deep
Drainage class: Moderately well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: High
Surface runoff: Very slow or slow
Depth to claypan: 5 to 10 inches
Depth to hardpan: 20 to 40 inches
Depth to bedrock: More than 60 inches
Water table: At the surface to 30 inches below the surface from February through April
Kind of water table: Perched
Hazard of water erosion in bare areas: Low

Characteristics of the Lasvar Soil

Position on the landscape: Toe slopes
Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 3 inches—mottled, grayish brown clay
3 to 28 inches—mottled, brown clay
28 to 31 inches—mottled, very pale brown silt loam
31 inches—hardpan
Depth class: Moderately deep
Drainage class: Somewhat poorly drained
Slowest permeability class: Slow
Available water capacity: Moderate
Highest shrink-swell potential: High
Surface runoff: Ponded
Depth to hardpan: 20 to 40 inches
Depth to bedrock: More than 60 inches
Depth to the water table: 6 to 36 inches from December through July; 36 to 72 inches from August through October
Kind of water table: Perched
Ponding: 6 inches above the surface from December through April for very long periods
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Channeled areas
• Nosoni soils, which are more than 60 inches deep and have less than 35 percent clay in the subsoil; on toe slopes
• Patburn soils, which are more than 60 inches deep and have more than 35 percent clay in the subsoil; on foot slopes
• Soils that are similar to the Burman soil but have a surface layer of very cobbly loam; on foot slopes
• Swanberger soils, which are more than 60 inches deep and are clay throughout; in stream channels

Use and Management

Land use: Livestock grazing or wetland wildlife habitat

Livestock grazing

Common plants on the Burman soil: Idaho fescue, Thurber needlegrass, low sagebrush
Common plants on the Lasvar soil: Danthonia, bluegrass, yampa

Major management factors: Burman—high water table; Lasvar—high water table, ponding, shrink-swell

Management considerations:

• Equipment use and livestock trampling can damage the soil and vegetation when the high water table and ponding occur during winter and early spring.

• The high water table, the ponding, and the shrink-swell potential limit the choice of plant species. Frequency, intensity, and duration of grazing can affect the dominance of hydrophytic plants.

• Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Wetland wildlife habitat

Management considerations:

• This unit can provide important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.

• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and applying proper water management techniques promote the reproduction of waterfowl.

• Drainage of wetlands in areas of this unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: Burman—IVs-3, nonirrigated; Lasvar—IVw-5, nonirrigated

MLRA: 22

Prime farmland: Considered prime farmland in irrigated areas that are drained

Range site: Burman—Shallow Cool Loam, MAP 18+ (22d); Lasvar—Clay Flat, MAP 18+ (22d)

122—Burney-Arkright complex, 2 to 9 percent slopes

Setting

Landform: Lava plateaus
Elevation: 3,000 to 3,300 feet
Slope range: 2 to 9 percent
Vegetation: Ponderosa pine, oak, shrubs, and grasses
Mean annual precipitation: 16 to 25 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Burney and similar soils: 40 percent
Arkright and similar soils: 40 percent
Contrasting inclusions: 20 percent

Characteristics of the Burney Soil

Position on the landscape: Toe slopes
Parent material: Slope alluvium from basalt
Typical profile:
1 inch to 0—duff
0 to 8 inches—brown gravelly loam
8 to 38 inches—reddish brown gravelly loam and reddish brown gravelly clay loam
38 to 59 inches—reddish brown very stony clay loam
59 inches—weathered basalt
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Arkright Soil

Position on the landscape: Foot slopes
Parent material: Slope alluvium from basalt
Typical profile:
1 inch to 0—duff
0 to 10 inches—brown gravelly loam
10 to 14 inches—reddish brown gravelly loam
14 to 24 inches—reddish brown cobbly clay loam
24 inches—weathered basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Hambone soils, which are 40 to 60 inches deep to weathered bedrock; on shoulders and foot slopes

• Jimmerson soils, which are more than 60 inches deep; on toe slopes

• Soils that are similar to the Arkright soil but are less than 20 inches deep; on shoulders

• Soils that are similar to the Burney soil but have more than 35 percent clay; on toe slopes

Use and Management

Land use: Timber production or homesite development

Woodland vegetation on the Burney soil

Main tree species: Ponderosa pine, California black oak, incense cedar, Oregon white oak
Mean site index for stated species: Ponderosa pine—80
Dunning site class: 3
CACTOS site index: 51
Common understory plants: Greenleaf manzanita, squawcarpet, deervetch, Klamath plum, muleears, antelope bitterbrush

Woodland vegetation on the Arkright soil

Main tree species: Ponderosa pine, Oregon white oak, California black oak
Mean site index for stated species: Ponderosa pine—69
Dunning site class: 4
CACTOS site index: 45
Common understory plants: Greenleaf manzanita, squawcarpet, antelope bitterbrush, squirreltail, muleears

Timber production

Major management factors: Burney—water erosion, compaction hazard, plant competition; Arkright—water erosion, depth to rock, compaction hazard, subsoil, limited available water capacity, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
• The depth to rock hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include ponderosa pine.

Homesite development

Major management factors: Burney—depth to rock, large stones, restricted permeability; Arkright—depth to rock
Management considerations:
• Maintaining a permanent cover of vegetation on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Large stones can hamper the digging of trenches for the foundation. In areas that have too many large stones, hand digging may be necessary.
• The limited depth to rock inhibits the filtering capacity of the leach fields or can prevent their placement. If the leach lines are placed too close to the bedrock, ground water may be contaminated by the effluent.
• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Burney—IIIe-4, nonirrigated; Arkright—IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Burney—5A; Arkright—4F

123—Canyoncreek-Hermit complex, 15 to 30 percent slopes

Setting

Landform: Mountains
Elevation: 6,000 to 7,100 feet
Slope range: 15 to 30 percent
Vegetation: White fir, ponderosa pine, and shrubs
Mean annual precipitation: 20 to 25 inches
Mean annual air temperature: 38 to 43 degrees F
Mean annual soil temperature: 38 to 44 degrees F
Frost-free period: 40 to 50 days

Composition

Canyoncreek and similar soils: 50 percent
Hermit and similar soils: 35 percent
Contrasting inclusions: 15 percent

Characteristics of the Canyoncreek Soil

Position on the landscape: Back slopes
Parent material: Tephra
Typical profile:
3 inches to 0—duff
0 to 19 inches—dark grayish brown and brown sandy loam
19 to 43 inches—brown very stony loam
43 to 58 inches—yellowish brown extremely gravelly loam
58 inches—weathered andesite
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Moderate

Characteristics of the Hermit Soil

Position on the landscape: Side slopes
Parent material: Tephra
Typical profile:
4 inches to 0—duff
0 to 28 inches—brown sandy loam
28 to 40 inches—brown very gravelly loam
40 inches—weathered andesite
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

- Gosch soils, which contain more than 35 percent rock fragments, have less than 35 percent clay in the subsoil, and have an argillic horizon; on side slopes
- Rock outcrop; on shoulders
- Soils that are less than 20 inches deep; on shoulders
- Soils that are similar to the Canyoncreek soil but are less than 40 inches deep to bedrock; on foot slopes
- Soils that are more than 60 inches deep to bedrock; on toe slopes
- Soils that have a buried argillic horizon; on toe slopes
- Soils that are similar to the Hermit soil but are less than 40 inches deep; on back slopes
- Witcher soils, which have less than 35 percent clay in the subsoil and have an argillic horizon; on side slopes

Use and Management

Land use: Timber production or homesite development

Woodland vegetation on the Canyoncreek soil

Main tree species: White fir, ponderosa pine
Mean site index for stated species: White fir—49
Dunning site class: 4
CACTOS site index: 48
Common understory plants: Serviceberry, snowbrush ceanothus, sticky currant, Sierra chinkapin, bitter cherry

Woodland vegetation on the Hermit soil

Main tree species: White fir and ponderosa pine
Mean site index for stated species: White fir—50
Dunning site class: 3
CACTOS site index: 54
Common understory plants: Sierra chinkapin, bitter cherry, serviceberry, snowbrush ceanothus, sticky currant

Timber production

Major management factors: Water erosion, compaction hazard, plant competition
Management considerations:
- Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- Roads and landings can be protected from erosion by constructing water bars.
- The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
- Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
- Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.

• Trees suitable for planting include white fir.

Homesite development

Major management factors: Water erosion, slope
Management considerations:
• Maintaining a permanent cover of vegetation on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• During construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.
• If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Canyoncreek and Hermit—VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Canyoncreek—6F; Hermit—6A

124—Canyoncreek-Hermit complex, 30 to 50 percent slopes

Setting

Landform: Mountains
Elevation: 6,000 to 7,100 feet
Slope range: 30 to 50 percent
Vegetation: White fir, ponderosa pine, and shrubs
Mean annual precipitation: 20 to 25 inches
Mean annual air temperature: 38 to 43 degrees F
Mean annual soil temperature: 38 to 44 degrees F
Frost-free period: 40 to 50 days

Composition

Canyoncreek and similar soils: 50 percent
Hermit and similar soils: 35 percent
Contrasting inclusions: 15 percent

Characteristics of the Canyoncreek Soil

Position on the landscape: Back slopes and shoulders
Parent material: Tephra
Typical profile:
3 inches to 0—duff
0 to 14 inches—brown sandy loam
14 to 36 inches—brown very cobbly loam and very stony loam
36 to 55 inches—yellowish brown extremely gravelly loam
55 inches—weathered andesite
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: High

Characteristics of the Hermit Soil

Position on the landscape: Back slopes
Parent material: Tephra
Typical profile:
4 inches to 0—duff
0 to 28 inches—brown sandy loam
28 to 40 inches—brown very gravelly loam
40 inches—weathered andesite
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: High

Contrasting Inclusions

• Gosch soils, which contain more than 35 percent rock fragments, have less than 35 percent clay in the subsoil, and have an argillic horizon; on side slopes
• Rock outcrop; on shoulders
• Soils that are less than 20 inches deep; on shoulders
• Soils that are similar to the Canyoncreek soil but are less than 40 inches deep to bedrock; on shoulders
• Soils that are more than 60 inches deep to bedrock; on back slopes
• Soils that have a buried argillic horizon; on back slopes
• Soils that are similar to the Hermit soil but are less than 40 inches deep to bedrock; on back slopes
• Witcher soils, which have less than 35 percent clay in the subsoil and have an argillic horizon; on side slopes

Use and Management

Land use: Timber production or homesite development

Woodland vegetation on the Canyoncreek soil

Main tree species: White fir and ponderosa pine
Mean site index for stated species: White fir—49
Dunning site class: 4
CACTOS site index: 48
Common understory plants: Serviceberry, snowbrush ceanothus, sticky currant, Sierra chinkapin, bitter cherry

Woodland vegetation on the Hermit soil

Main tree species: White fir, ponderosa pine, incense cedar
Mean site index for stated species: White fir—50
Dunning site class: 3
CACTOS site index: 54
Common understory plants: Sierra chinkapin, bitter cherry, serviceberry, snowbrush ceanothus, sticky currant

Timber production

Major management factors: Slope, water erosion, compaction hazard, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• The slope limits the kinds of equipment that can be used in forest management.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir.

Homesite development

Major management factors: Water erosion, slope
Management considerations:
• Maintaining a permanent cover of vegetation on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• During construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.
• If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Canyoncreek and Hermit—VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Canyoncreek and Hermit—6R

125—Carberry gravelly fine sandy loam, 2 to 15 percent slopes

Setting

Landform: Lava plateaus and hills
Elevation: 4,600 to 5,800 feet
Slope range: 2 to 15 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 35 to 45 inches
Mean annual air temperature: 39 to 41 degrees F
Mean annual soil temperature: 42 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Carberry and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Carberry Soil

Parent material: Tephra
Typical profile:
3 inches to 0—duff
0 to 5 inches—dark brown gravelly fine sandy loam

5 to 12 inches—brown gravelly fine sandy loam
12 to 17 inches—brown very gravelly fine sandy loam
17 to 50 inches—brown and reddish yellow extremely gravelly loam
50 inches—hard basaltic andesite
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Lava flow outcrops; on shoulders
• Soils that are 20 to 40 inches deep to bedrock; on shoulders
• Soils that have less than 35 percent rock fragments; on toe slopes
• Stream channels

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, Douglas-fir, sugar pine, ponderosa pine, incense cedar
Mean site index for stated species: White fir—66
Dunning site class: 2
CACTOS site index: 74
Common understory plants: Greenleaf manzanita, snowbrush ceanothus, scouler willow, serviceberry, Sierra chinkapin, brackenfern

Timber production

Major management factors: Water erosion, compaction hazard, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir and ponderosa pine.

Interpretive Groups

Land capability classification: IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 10F

126—Carberry gravelly fine sandy loam, 15 to 30 percent slopes

Setting

Landform: Lava plateaus and hills
Elevation: 4,600 to 5,800 feet
Slope range: 15 to 30 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 35 to 45 inches
Mean annual air temperature: 39 to 41 degrees F
Mean annual soil temperature: 42 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Carberry and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Carberry Soil

Parent material: Tephra
Typical profile:
3 inches to 0—duff
0 to 5 inches—dark brown gravelly fine sandy loam
5 to 12 inches—brown gravelly fine sandy loam
12 to 17 inches—brown very gravelly fine sandy loam
17 to 50 inches—brown and reddish yellow extremely gravelly loam
50 inches—hard basaltic andesite
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches

Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

- Lava flow outcrops; on shoulders
- Areas that have slopes of less than 15 percent
- Soils that are 20 to 40 inches deep to bedrock; on shoulders
- Soils that have less than 35 percent rock fragments; on foot slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, incense cedar, sugar pine, ponderosa pine, Douglas-fir
Mean site index for stated species: White fir—66
Dunning site class: 2
CACTOS site index: 74
Common understory plants: Greenleaf manzanita, snowbrush ceanothus, scouler willow, serviceberry, Sierra chinkapin, brackenfern

Timber production

Major management factors: Water erosion, compaction hazard, plant competition
Management considerations:
- Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- Roads and landings can be protected from erosion by constructing water bars.
- Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
- The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
- Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
- Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
- Trees suitable for planting include white fir and ponderosa pine.

Interpretive Groups

Land capability classification: IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 10F

127—Carberry gravelly fine sandy loam, 30 to 50 percent slopes

Setting

Landform: Hills
Elevation: 4,600 to 5,800 feet
Slope range: 30 to 50 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 35 to 45 inches
Mean annual air temperature: 39 to 41 degrees F
Mean annual soil temperature: 42 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Carberry and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Carberry Soil

Parent material: Tephra
Typical profile:
3 inches to 0—duff
0 to 5 inches—dark brown gravelly fine sandy loam
5 to 12 inches—brown gravelly fine sandy loam
12 to 17 inches—brown very gravelly fine sandy loam
17 to 50 inches—brown and reddish yellow extremely gravelly loam
50 inches—hard basaltic andesite
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: High

Contrasting Inclusions

- Lava flow outcrops; on shoulders
- Soils that are 20 to 40 inches deep to bedrock; on shoulders

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, sugar pine, incense cedar, Douglas-fir, ponderosa pine
Mean site index for stated species: White fir—66
Dunning site class: 2
CACTOS site index: 74
Common understory plants: Greenleaf manzanita, snowbrush ceanothus, scouler willow, serviceberry, Sierra chinkapin, brackenfern

Timber production

Major management factors: Water erosion, slope, compaction hazard, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• The slope limits the kinds of equipment that can be used in forest management.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Trees suitable for planting include white fir and ponderosa pine.

Interpretive Groups

Land capability classification: VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 10R

128—Carberry, warm-Ponto complex, 2 to 15 percent slopes

Setting

Landform: Lava plateaus and hills
Elevation: 3,400 to 5,000 feet
Slope range: 2 to 15 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 30 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 49 degrees F
Frost-free period: 80 to 100 days

Composition

Carberry and similar soils: 60 percent
Ponto and similar soils: 25 percent
Contrasting inclusions: 15 percent

Characteristics of the Carberry Soil

Position on the landscape: Foot slopes
Parent material: Tephra
Slope: 5 to 15 percent
Typical profile:
3 inches to 0—duff
0 to 9 inches—brown gravelly fine sandy loam
9 to 19 inches—brown very gravelly fine sandy loam
19 to 60 inches—strong brown extremely gravelly loam
60 inches—hard basaltic andesite
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Ponto Soil

Position on the landscape: Toe slopes
Parent material: Volcanic ash
Typical profile:
3 inches to 0—duff
0 to 6 inches—dark brown sandy loam
6 to 80 inches—brown sandy loam and very pale brown loam

Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

- Areas that have slopes of 15 to 30 percent
- Lava flow outcrops; on shoulders
- Neer soils, which are 20 to 40 inches deep to hard bedrock; on shoulders
- Soils that are similar to the Carberry soil but have well rounded gravel throughout; near stream channels

Use and Management

Land use: Timber production

Woodland vegetation on the Carberry soil

Main tree species: White fir, ponderosa pine, incense cedar, sugar pine
Mean site index for stated species: White fir—66
Dunning site class: 2
CACTOS site index: 74
Common understory plants: Snowbrush ceanothus, greenleaf manzanita, Sierra chinkapin, serviceberry, scouler willow, brackenfern

Woodland vegetation on the Ponto soil

Main tree species: Ponderosa pine, incense cedar, white fir, sugar pine, Douglas-fir
Mean site index for stated species: Ponderosa pine—137; white fir—87
Dunning site class: 1A
CACTOS site index: 95
Common understory plants: Greenleaf manzanita, squawcarpet, Sierra chinkapin, deerbrush, snowbrush ceanothus, bitter cherry

Timber production

Major management factors: Carberry—compaction hazard, plant competition; Ponto—water erosion, plant competition
Management considerations:
- Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 30 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- Roads and landings can be protected from erosion by constructing water bars.
- The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
- Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
- Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
- Trees suitable for planting include white fir, ponderosa pine, and Douglas-fir.

Interpretive Groups

Land capability classification: Carberry and Ponto—IIIe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Carberry—10F; Ponto—15A

129—Carberry, warm-Ponto complex, 15 to 30 percent slopes

Setting

Landform: Hills
Elevation: 3,200 to 4,600 feet
Slope range: 15 to 30 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 30 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 49 degrees F
Frost-free period: 80 to 100 days

Composition

Carberry and similar soils: 60 percent
Ponto and similar soils: 25 percent
Contrasting inclusions: 15 percent

Characteristics of the Carberry Soil

Position on the landscape: Side slopes
Parent material: Tephra
Typical profile:
3 inches to 0—duff
0 to 9 inches—brown gravelly fine sandy loam
9 to 19 inches—brown very gravelly fine sandy loam
19 to 60 inches—strong brown extremely gravelly loam
60 inches—hard basaltic andesite
Depth class: Deep

Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Ponto Soil

Position on the landscape: Side slopes
Parent material: Volcanic ash
Typical profile:
3 inches to 0—duff
0 to 6 inches—brown sandy loam
6 to 80 inches—brown sandy loam and strong brown loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

• Lava flow outcrops; on shoulders
• Neer soils, which are 20 to 40 inches deep to weathered bedrock; on shoulders
• Soils that are similar to the Carberry soil but are more than 60 inches deep to bedrock; on foot slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Carberry soil

Main tree species: White fir, sugar pine, ponderosa pine, Douglas-fir, incense cedar, California black oak
Mean site index for stated species: White fir—66
Dunning site class: 2
CACTOS site index: 74
Common understory plants: Serviceberry, greenleaf manzanita, brackenfern, snowbrush ceanothus, Sierra chinkapin, scouler willow

Woodland vegetation on the Ponto soil

Main tree species: White fir, sugar pine, incense cedar, Douglas-fir, ponderosa pine
Mean site index for stated species: White fir—87; ponderosa pine—137
Dunning site class: 1A
CACTOS site index: 95
Common understory plants: Greenleaf manzanita, Sierra chinkapin, deerbrush, snowbrush ceanothus, bitter cherry, squawcarpet

Timber production

Major management factors: Carberry—water erosion, compaction hazard, plant competition; Ponto—water erosion, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir, ponderosa pine, and Douglas-fir.

Interpretive Groups

Land capability classification: Carberry and Ponto—IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Carberry—10F; Ponto—15A

130—Carberry, warm-Lava flows complex, 15 to 30 percent slopes

Setting

Landform: Lava plateaus and hills
Elevation: 3,400 to 5,000 feet
Slope range: 15 to 30 percent
Vegetation: Mixed conifers and shrubs

Mean annual precipitation: 30 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 49 degrees F
Frost-free period: 80 to 100 days

Composition

Carberry and similar soils: 60 percent
Lava flows: 25 percent
Contrasting inclusions: 15 percent

Characteristics of the Carberry Soil

Position on the landscape: Side slopes
Parent material: Tephra
Slope: 30 to 50 percent
Typical profile:
3 inches to 0—duff
0 to 9 inches—brown gravelly fine sandy loam
9 to 19 inches—brown very gravelly fine sandy loam
19 to 60 inches—strong brown extremely gravelly loam
60 inches—hard basaltic andesite
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Moderate

Characteristics of the Lava Flows

• Lava flows consist of areas covered by geologically recent lava. They are characterized by sharp, jagged, broken blocks piled in tumbled heaps and have many crevices, sinkholes, and collapsed lava tubes. Most areas are vegetated by such plants as ponderosa pine, antelope bitterbrush, greenleaf manzanita, and Modoc cypress, but some areas are virtually devoid of vegetation.

Contrasting Inclusions

• Neer soils, which are 20 to 40 inches deep to hard bedrock; on shoulders
• Ponto soils that have slopes of less than 15 percent; on foot slopes
• Areas that have slopes of 50 to 60 percent

Use and Management

Land use: Timber production

Woodland vegetation on the Carberry soil

Main tree species: White fir, incense cedar, sugar pine, ponderosa pine, Douglas-fir, California black oak
Mean site index for stated species: White fir—66
Dunning site class: 2
CACTOS site index: 74
Common understory plants: Snowbrush ceanothus, Sierra chinkapin, greenleaf manzanita, serviceberry, scouler willow, brackenfern

Timber production

Major management factors: Carberry—water erosion, slope, compaction hazard, plant competition; Lava flows—depth to rock, rock fragments
Management considerations:
• Roads and landings can be protected from erosion by constructing water bars.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• The slope limits the kinds of equipment that can be used in forest management.
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
• The routing of equipment should be planned before operations are begun.
• The rock fragments on the surface can interfere with felling, yarding, and other activities involving the use of equipment and can limit the choice of mechanized planting equipment.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Lava flows tend to interfere with felling and yarding activities and with other uses of equipment. Traffic should be limited in these areas during harvest.
• Trees suitable for planting include white fir, ponderosa pine, and Douglas-fir.

Interpretive Groups

Land capability classification: Carberry—IVe-4, nonirrigated; Lava flows—VIII, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Carberry—10F

131—Chalkford loam, 0 to 2 percent slopes

Setting

Landform: Stream terraces
Elevation: 4,200 to 4,300 feet
Slope range: 0 to 2 percent
Vegetation: Grasses and big sagebrush
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Chalkford and similar soils: 90 percent
Contrasting inclusions: 10 percent

Characteristics of the Chalkford Soil

Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 9 inches—dark grayish brown loam
9 to 35 inches—dark grayish brown and gray clay loam
35 to 62 inches—light gray clay loam
Depth class: Very deep
Drainage class: Somewhat poorly drained
Slowest permeability class: Moderately slow
Available water capacity: Very high
Highest shrink-swell potential: Moderate
Surface runoff: Very slow
Depth to bedrock: More than 60 inches
Frequency of flooding: Occasional; from December through April
Depth to the water table: 36 to 60 inches from April through June
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Dotta soils, which are more than 60 inches deep and have a gravelly substratum; on foot slopes
• Soils that have clay in the lower part of the subsoil; on the lower toe slopes
• Soils that have a gravelly substratum; near stream channels
• Soils that have a moderately alkaline subsoil; on foot slopes
• Soils that have a water table at a depth of 30 inches; near stream channels

Use and Management

Land use: Irrigated crops and pasture

Irrigated crops

Common crops: Alfalfa, grass-legume hay, barley, and wheat
Major management factors: Flooding, high water table
Management considerations:
• The hazard of flooding should be considered before any cropping is done or capital improvements are installed.
• The high water table limits the choice of crops and cultivars and increases the risk of winterkill.
• Careful management of irrigation is needed to avoid raising the water table.

Pasture

Major management factors: Flooding, high water table
Management considerations:
• Livestock operations can be impaired by flooding in winter and spring.
• The flooding should be considered when stand renovation or reestablishment is planned.
• The high water table enhances forage production and extends the green feed period.
• If seeding is desired, species that are adapted to flooding and a high water table should be considered.

Interpretive Groups

Land capability classification: IIIw-2, irrigated and nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland in all areas

132—Chatterdown-Nikal complex, 2 to 15 percent slopes

Setting

Landform: Lava plateaus and hills
Elevation: 3,000 to 4,500 feet
Slope range: 2 to 15 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 48 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Chatterdown and similar soils: 60 percent
Nikal and similar soils: 25 percent
Contrasting inclusions: 15 percent

Characteristics of the Chatterdown Soil

Position on the landscape: Foot slopes
Parent material: Volcanic ash
Typical profile:
1 inch to 0—duff
0 to 15 inches—dark grayish brown and brown fine sandy loam
15 to 30 inches—brown fine sandy loam
30 to 47 inches—dark yellowish brown fine sandy loam
47 to 63 inches—yellowish brown sandy loam
63 inches—fractured basalt
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Nikal Soil

Position on the landscape: Small pockets and cracks on top of lava plateaus and ridges
Parent material: Glacial outwash from extrusive igneous rock
Typical profile:
1 inch to 0—duff
0 to 10 inches—dark brown gravelly sandy loam
10 to 36 inches—dark brown very gravelly sandy loam
36 inches—fractured basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Gasper soils, which have more than 35 percent rock fragments, have less than 35 percent clay in the subsoil, and have an argillic horizon; on toe slopes
• Scarface soils, which have less than 35 percent clay in the subsoil and have an argillic horizon; on toe slopes
• Soils that are similar to the Nikal soil but are less than 20 inches deep; on shoulders
• Soils that are similar to the Chatterdown soil but have more than 35 percent coarse fragments; on side slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Chatterdown soil

Main tree species: White fir, ponderosa pine, incense cedar
Mean site index for stated species: Ponderosa pine—113
Dunning site class: 1
CACTOS site index: 75
Common understory plants: Antelope bitterbrush, whitethorn ceanothus, greenleaf manzanita, deerbrush

Woodland vegetation on the Nikal soil

Main tree species: Ponderosa pine, incense cedar, lodgepole pine, white fir
Mean site index for stated species: Ponderosa pine—101
Dunning site class: 2
CACTOS site index: 65
Common understory plants: Deerbrush, bitter cherry, greenleaf manzanita, squawcarpet, antelope bitterbrush

Timber production

Major management factors: Chatterdown—water erosion, plant competition; Nikal—water erosion, depth to rock, compaction hazard, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.

• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include ponderosa pine.

Interpretive Groups

Land capability classification: Chatterdown—IIIe-4, nonirrigated; Nikal—IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Chatterdown—9A; Nikal—7A

133—Chirpchatter-Hunsinger complex, 2 to 15 percent slopes

Setting

Landform: Hills
Elevation: 3,100 to 4,500 feet
Slope range: 2 to 15 percent
Vegetation: Ponderosa pine, oak, shrubs, and grasses
Mean annual precipitation: 20 to 25 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 49 degrees F
Frost-free period: 80 to 100 days

Composition

Chirpchatter and similar soils: 55 percent
Hunsinger and similar soils: 25 percent
Contrasting inclusions: 20 percent

Characteristics of the Chirpchatter Soil

Position on the landscape: Foot slopes
Parent material: Older ashfalls
Typical profile:
1 inch to 0—duff
0 to 7 inches—yellowish brown sandy loam
7 to 32 inches—brown sandy clay loam
32 to 70 inches—brown and light yellowish brown gravelly sandy loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Moderate
Highest shrink-swell potential: Moderate
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Hunsinger Soil

Position on the landscape: Back slopes
Parent material: Colluvium from extrusive igneous rock
Typical profile:
0 to 13 inches—brown gravelly sandy loam
13 to 26 inches—strong brown very cobbly sandy clay loam
26 to 42 inches—strong brown cobbly sandy clay loam
42 inches—strongly weathered basalt
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Low
Highest shrink-swell potential: Moderate
Surface runoff: Medium
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Fault escarpments; on shoulders
• Jellico soils, which are 20 to 40 inches deep; on toe slopes and near escarpments
• Areas that have slopes of more than 15 percent
• Winnibulli soils, which are more than 60 inches deep; on toe slopes

Use and Management

Land use: Timber production or homesite development

Woodland vegetation on the Chirpchatter soil

Main tree species: Ponderosa pine, incense cedar, California black oak, Oregon white oak
Mean site index for stated species: Ponderosa pine—75
Dunning site class: 4
CACTOS site index: 49
Common understory plants: Mountain big sagebrush, squawcarpet, greenleaf manzanita, buckbrush, antelope bitterbrush

Woodland vegetation on the Hunsinger soil

Main tree species: Ponderosa pine, incense cedar, California black oak
Mean site index for stated species: Ponderosa pine—75
Dunning site class: 3
CACTOS site index: 54
Common understory plants: Squawcarpet, bluegrass,

needlegrass, greenleaf manzanita, Idaho fescue, antelope bitterbrush

Timber production

Major management factors: Chirpchatter—water erosion, compaction hazard, plant competition; Hunsinger—compaction hazard, limited available water capacity, plant competition
Management considerations:
• Roads and landings can be protected from erosion by constructing water bars.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The limited available water capacity in the upper 24 inches of the soil reduces the rate of seedling survival and hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir and ponderosa pine.

Homesite development

Major management factors: Chirpchatter—slope, shrink-swell, restricted permeability; Hunsinger—slope, large stones, shrink-swell, restricted permeability
Management considerations:
• During construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.
• Large stones can hamper the digging of trenches for the foundation. In areas that have too many large stones, hand digging may be necessary. Any stones larger than the trench width can be left in place.
• The effects of shrinking and swelling can be minimized by using proper engineering designs or backfilling with material that has a low shrink-swell potential.
• If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.
• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Chirpchatter—IIIe-1, nonirrigated; Hunsinger—IVe-7, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Chirpchatter—4S; Hunsinger—4F

134—Coneward loamy sand, 2 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 3,400 to 4,200 feet
Slope range: 2 to 15 percent
Vegetation: Pine, juniper, and grasses
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Coneward and similar soils: 80 percent
Contrasting inclusions: 20 percent

Characteristics of the Coneward Soil

Parent material: Eolian deposits and alluvial deposits from extrusive igneous rock
Typical profile:
0 to 8 inches—brown loamy sand
8 to 55 inches—very dark gray silty clay loam
55 to 60 inches—light yellowish brown, weakly cemented loamy sand
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability class: Rapid
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Jellico soils, which are 20 to 40 inches deep to hard bedrock and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on escarpments
• Lava flow outcrops; on shoulders
• Splawn soils, which are 20 to 40 inches deep to hard bedrock and have more than 35 percent clay and rock fragments in the subsoil; on toe slopes

Use and Management

Land use: Wood products or grazing

Woodland vegetation

Main woodland species: Western juniper, Digger pine, ponderosa pine, Oregon white oak
Mean site index for stated species: Ponderosa pine—77
Dunning site class: 3
CACTOS site index: 50
Common understory plants: Lupine, antelope bitterbrush, curlleaf mountainmahogany, Klamath plum, Columbia needlegrass, greenleaf manzanita

Wood products

Major management factors: Coarse texture, limited available water capacity, compaction hazard, hazard of fire damage
Management considerations:
• The coarse texture throughout the profile hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• High summer soil temperatures and low soil moisture content result in a high seedling mortality rate, especially on south and southwest aspects.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.

Woodland grazing

Major management factors: Coarse texture
Management considerations:
• If seeding is desired, species that are adapted to droughty conditions should be considered.

Interpretive Groups

Land capability classification: IVs-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 4S

135—Coneward loamy sand, 15 to 30 percent slopes

Setting

Landform: Hills
Elevation: 2,800 to 3,100 feet
Slope range: 15 to 30 percent
Vegetation: Mixed conifers, oaks, and shrubs
Mean annual precipitation: 16 to 22 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Coneward and similar soils: 75 percent
Contrasting inclusions: 25 percent

Characteristics of the Coneward Soil

Parent material: Eolian deposits and alluvial deposits from extrusive igneous rock
Typical profile:
0 to 8 inches—dark brown loamy sand
8 to 50 inches—dark brown and dark yellowish brown loamy sand
50 to 60 inches—light yellowish brown, weakly cemented loamy sand
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability class: Rapid
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

• Britton soils, which are less than 20 inches deep and have more than 35 percent clay in the subsoil; on back slopes
• Jadpor soils, which have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on foot slopes
• Areas that have slopes of 5 to 15 percent or 30 to 50 percent
• Soils near Lake Britton that have a dark surface layer and sandy loam textures throughout; on foot slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: Western juniper, Digger pine, ponderosa pine, Oregon white oak
Mean site index for stated species: Ponderosa pine—77
Dunning site class: 3
CACTOS site index: 50
Common understory plants: Columbia needlegrass, Klamath plum, curlleaf mountainmahogany, lupine, antelope bitterbrush, greenleaf manzanita

Timber production

Major management factors: Water erosion, coarse texture, compaction hazard, limited available water capacity, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• The coarse texture throughout the profile hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include ponderosa pine.

Interpretive Groups

Land capability classification: IVs-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 4S

136—Coneward loamy sand, 30 to 50 percent slopes

Setting

Landform: Hills
Elevation: 2,800 to 3,100 feet
Slope range: 30 to 50 percent
Vegetation: Mixed conifers, oaks, and shrubs
Mean annual precipitation: 16 to 22 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Coneward and similar soils: 75 percent
Contrasting inclusions: 25 percent

Characteristics of the Coneward Soil

Parent material: Eolian deposits and alluvial deposits from extrusive igneous rock
Typical profile:
0 to 8 inches—brown loamy sand
8 to 50 inches—brown and dark brown loamy sand
50 to 60 inches—light yellowish brown, weakly cemented loamy sand
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability class: Rapid
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: High

Contrasting Inclusions

• Britton soils, which are less than 20 inches deep to weathered bedrock; on back slopes
• Areas that have slopes of 15 to 30 percent
• Soils near Lake Britton that have a dark surface layer and sandy loam textures throughout; on foot slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: Western juniper, Digger pine, ponderosa pine, Oregon white oak
Mean site index for stated species: Ponderosa pine—77
Dunning site class: 3

CACTOS site index: 50
Common understory plants: Columbia needlegrass, Klamath plum, curlleaf mountainmahogany, lupine, antelope bitterbrush, greenleaf manzanita

Timber production

Major management factors: Water erosion, slope, coarse texture, compaction hazard, limited available water capacity, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• The slope limits the kinds of equipment that can be used in forest management.
• The coarse texture throughout the profile hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The use of equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include ponderosa pine.

Interpretive Groups

Land capability classification: VIs, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 4R

137—Coneward-Lava flows complex, 2 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 3,400 to 4,200 feet
Slope range: 2 to 15 percent
Vegetation: Pine, juniper, and grasses
Mean annual precipitation: 12 to 20 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Coneward and similar soils: 40 percent
Lava flows: 35 percent
Contrasting inclusions: 25 percent

Characteristics of the Coneward Soil

Position on the landscape: Between outcrops of Lava flows
Parent material: Eolian deposits and alluvial deposits from extrusive igneous rock
Typical profile:
0 to 8 inches—brown and dark yellowish brown loamy sand
8 to 50 inches—brown, dark yellowish brown, and light yellowish brown loamy sand
50 to 60 inches—light yellowish brown, weakly cemented loamy sand
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability class: Rapid
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low
Hazard of soil blowing in bare areas: None

Characteristics of the Lava Flows

• Lava flows consist of areas covered by geologically recent lava. They are characterized by sharp, jagged, broken blocks piled in tumbled heaps and have many crevices, sinkholes, and collapsed lava tubes. Most areas are vegetated by such plants as western juniper, ponderosa pine, antelope bitterbrush, manzanita, and Modoc cypress; however, some areas are virtually devoid of vegetation.

Contrasting Inclusions

• Cinderland on cones that have slopes of 30 to 50 percent
• Jellico soils, which are 20 to 40 inches deep and have more than 35 percent rock fragments in the profile; on foot slopes
• Rubble land; on escarpments
• Soils that are less than 40 inches deep to hard bedrock; near escarpments

Use and Management

Land use: Wood products or grazing

Woodland vegetation on the Coneward soil

Main woodland species: Western juniper, Digger pine, ponderosa pine, Oregon white oak
Mean site index for stated species: Ponderosa pine—77
Dunning site class: 3
CACTOS site index: 50
Common understory plants: Curlleaf mountainmahogany, lupine, Klamath plum, antelope bitterbrush, Columbia needlegrass, greenleaf manzanita

Wood products

Major management factors: Coneward—coarse texture, compaction hazard, fire damage; Lava flows—rock fragments
Management considerations:
• The rock fragments on the surface can interfere with the harvesting of wood products.
• High summer soil temperatures and low soil moisture content can cause a high seedling mortality rate, especially on south- and southwest-facing slopes.
• The coarse texture throughout the profile hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The loose sandy surface can be easily damaged by tracked or wheeled equipment. Revegetation and access are difficult in areas of this unit.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.

Woodland grazing

Major management factors: Coneward—coarse texture; Lava flows—depth to rock
Management considerations:
• Forage production is limited by the coarse texture of the Coneward soil. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on Lava flows may require special design.

Interpretive Groups

Land capability classification: Coneward—IVs-4, nonirrigated; Lava flows—VIII, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Coneward—4S

138—Cupvar silty clay, 0 to 2 percent slopes

Setting

Landform: Basins
Elevation: 4,100 to 4,500 feet
Slope range: 0 to 2 percent
Vegetation: Grasses and sagebrush
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 50 to 52 degrees F
Frost-free period: 100 to 120 days

Composition

Cupvar and similar soils: 90 percent
Contrasting inclusions: 10 percent

Characteristics of the Cupvar Soil

Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 21 inches—dark grayish brown silty clay
21 to 25 inches—hardpan
25 to 64 inches—light yellowish brown fine sandy loam
Depth class: Moderately deep
Drainage class: Moderately well drained
Slowest permeability class: Slow
Available water capacity: High
Highest shrink-swell potential: High
Surface runoff: Very slow or slow
Depth to hardpan: 20 to 40 inches
Depth to bedrock: More than 60 inches
Frequency of flooding: Frequent; for long periods from December through February
Water table: At the surface to 18 inches below the surface from December through February; at a depth of 18 to 48 inches from March through May; at a depth of 48 to 72 inches from June through October
Kind of water table: Perched
Ponding: 6 inches above the surface from December through January for brief periods
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Esperanza soils, which are 40 to 60 inches deep to a hardpan; on foot slopes
• Pittville soils, which are more than 60 inches deep and have less than 35 percent clay in the subsoil; on foot slopes
• Soils that are more than 40 inches deep to a hardpan; on foot slopes

Use and Management

Land use: Pasture, irrigated crops, or homesite development

Pasture

Major management factors: High water table, ponding, shrink-swell
Management considerations:
• The high water table saturates the soil in the winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
• The high water table and the ponding limit the choice of plant species. Frequency, intensity, and duration of grazing can affect the dominance of hydrophytic plants.

Irrigated crops

Common crops: Grass-legume hay and barley
Major management factors: Cemented pan, high water table, ponding, slow permeability
Management considerations:
• On soils that have a cemented pan, intensive management of irrigation water is needed to prevent the buildup of a perched water table. Ripping or subsoiling can permanently enhance the root environment.
• The high water table and the ponding can damage deep-rooted crops.
• Careful management of irrigation is needed to avoid raising the water table.
• Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.

Homesite development

Major management factors: Cemented pan, flooding, ponding
Management considerations:
• Flooding or ponding can occur during the winter and early spring. The foundation should be taller than normal, or the buildings should be constructed at the highest elevations. Water should be intercepted by drainage ditches, or a drainage system should be installed around the foundation.
• The cemented pan reduces the volume of soil that is available for filtering effluent. Tests should be made below the pan depth to determine whether the lines should be placed at this depth.
• The flooding can add water to the septic system. Diversion of floodwater may be needed.
• The ponding can also add water to the septic system. Constructing a drainage system or a mounded leach field can reduce the effects of ponding.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: IVw-2, irrigated and nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland

139—Danhunt gravelly sandy loam, 15 to 30 percent slopes

Setting

Landform: Mountains
Elevation: 4,700 to 6,200 feet
Slope range: 15 to 30 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 39 to 41 degrees F
Mean annual soil temperature: 41 to 45 degrees F
Frost-free period: 50 to 80 days

Composition

Danhunt and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Danhunt Soil

Parent material: Tephra
Typical profile:
3 inches to 0—duff
0 to 2 inches—brown gravelly sandy loam
2 to 11 inches—pale brown gravelly coarse sandy loam
11 to 22 inches—pale brown very gravelly coarse sandy loam
22 to 38 inches—pale brown very gravelly loamy coarse sand
38 to 61 inches—light gray extremely gravelly coarse sandy loam
61 inches—weathered andesitic porphyry
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid

Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Obie soils, which are 40 to 60 inches deep to weathered bedrock and have medial-skeletal material; on back slopes
• Rock outcrop; on shoulders
• Soils that are 20 to 40 inches deep to weathered bedrock; on shoulders
• Stacher soils, which have medial over loamy-skeletal material; on back slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, ponderosa pine, California red fir, sugar pine, Douglas-fir
Mean site index for stated species: White fir—79
Dunning site class: 1A
CACTOS site index: 88
Common understory plants: Greenleaf manzanita, Sierra chinkapin, snowbrush ceanothus, princes pine, Pacific dogwood, Sierra gooseberry

Timber production

Major management factors: Water erosion, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir and ponderosa pine.

Interpretive Groups

Land capability classification: IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 13F

140—Danhunt gravelly sandy loam, 30 to 50 percent slopes

Setting

Landform: Mountains
Elevation: 4,700 to 6,200 feet
Slope range: 30 to 50 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 39 to 41 degrees F
Mean annual soil temperature: 41 to 45 degrees F
Frost-free period: 50 to 80 days

Composition

Danhunt and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Danhunt Soil

Parent material: Tephra
Typical profile:
3 inches to 0—duff
0 to 2 inches—brown gravelly sandy loam
2 to 11 inches—pale brown gravelly coarse sandy loam
11 to 22 inches—pale brown very gravelly coarse sandy loam
22 to 38 inches—pale brown very gravelly loamy coarse sand
38 to 61 inches—light gray extremely gravelly coarse sandy loam
61 inches—weathered andesitic porphyry
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate or high

Contrasting Inclusions

• Obie soils, which are 40 to 60 inches deep to weathered bedrock; on back slopes

• Rock outcrop; on shoulders
• Soils that are 20 to 40 inches deep to weathered bedrock; on shoulders
• Soils that have less than 35 percent rock fragments; on foot slopes
• Stacher soils, which have medial over loamy-skeletal material; on foot slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, sugar pine, Douglas-fir, California red fir, ponderosa pine
Mean site index for stated species: White fir—79
Dunning site class: 1A
CACTOS site index: 88
Common understory plants: Greenleaf manzanita, Sierra chinkapin, princes pine, Pacific dogwood, snowbrush ceanothus, Sierra gooseberry

Timber production

Major management factors: Slope, water erosion, plant competition, hazard of fire damage
Management considerations:
• The slope limits the kinds of equipment that can be used in forest management.
• Roads and landings can be protected from erosion by constructing water bars.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Fire can damage the soil by killing beneficial micro-organisms and reducing the content of organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Trees suitable for planting include white fir and ponderosa pine.

Interpretive Groups

Land capability classification: VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 13R

141—Danhunt gravelly sandy loam, 50 to 75 percent slopes

Setting

Landform: Mountains
Elevation: 4,700 to 6,200 feet
Slope range: 50 to 75 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 39 to 41 degrees F
Mean annual soil temperature: 41 to 45 degrees F
Frost-free period: 50 to 80 days

Composition

Danhunt and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Danhunt Soil

Parent material: Tephra
Typical profile:
3 inches to 0—duff
0 to 2 inches—brown gravelly sandy loam
2 to 11 inches—pale brown gravelly coarse sandy loam
11 to 22 inches—pale brown very gravelly coarse sandy loam
22 to 38 inches—pale brown very gravelly loamy coarse sand
38 to 61 inches—light gray extremely gravelly coarse sandy loam
61 inches—weathered andesitic porphyry
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Very rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: High

Contrasting Inclusions

• Rock outcrop; on shoulders
• Soils that are 20 to 40 inches deep to weathered bedrock; on shoulders

• Stacher soils, which have medial over loamy-skeletal material; on foot slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, California red fir, ponderosa pine, sugar pine, Douglas-fir
Mean site index for stated species: White fir—79
Dunning site class: 1A
CACTOS site index: 88
Common understory plants: Greenleaf manzanita, Sierra chinkapin, princes pine, Pacific dogwood, snowbrush ceanothus, Sierra gooseberry

Timber production

Major management factors: Water erosion, slope, very rapid runoff, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Maintaining the understory vegetation is essential in controlling erosion.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• Using conventional harvesting methods is difficult because of the slope.
• The slope limits the use of wheeled and tracked equipment in skidding operations. End lining generally causes less disturbance of the soil.
• The very rapid runoff rate can result in severe erosion if water is allowed to concentrate in bare areas, such as skid trails or roads.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir and ponderosa pine.

Interpretive Groups

Land capability classification: VIIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 13R

142—Daphnedale loam, 9 to 15 percent slopes

Setting

Landform: Stream terraces
Elevation: 4,200 to 4,400 feet
Slope range: 9 to 15 percent
Vegetation: Big sagebrush, shrubs, grasses, and scattered juniper
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 49 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Daphnedale and similar soils: 80 percent
Contrasting inclusions: 20 percent

Characteristics of the Daphnedale Soil

Parent material: Lacustrine deposits from basic igneous rock
Typical profile:
0 to 3 inches—grayish brown loam
3 to 25 inches—grayish brown and brown clay loam
25 to 36 inches—very pale brown sandy clay loam
36 inches—soft lacustrine tuff
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Moderate
Highest shrink-swell potential: High
Surface runoff: Medium
Depth to claypan: 10 to 20 inches
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

• Dotta soils, which are more than 60 inches deep and have less than 35 percent clay in the subsoil; on toe slopes

• Erig soils, which are 40 to 60 inches deep to weathered bedrock and have less than 35 percent clay in the subsoil; on foot slopes
• Soils that are less than 20 inches deep to bedrock; on shoulders

Use and Management

Land use: Livestock grazing or irrigated crops

Livestock grazing

Common plants: Rubber rabbitbrush, bluebunch wheatgrass, mountain big sagebrush, basin wildrye
Major management factors: Water erosion
Management considerations:
• If the soil is grazed to a bare condition, the loss of the surface layer by water erosion severely reduces productivity and the potential to produce vegetation suitable for grazing.
• Maintaining a cover of vegetation, such as grass and brush, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.

Irrigated crops

Common crops: Alfalfa, grass-legume hay, barley, and wheat
Major management factors: Water erosion, slope, depth to the claypan, depth to rock, slow permeability
Management considerations:
• Maintaining a cover of vegetation, such as crop residue and grass, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• During periods when the soil is bare, erosion can be controlled by properly managing crop residue or planting a cover crop.
• Limiting tillage for seedbed preparation and weed control helps to control runoff and erosion.
• Sprinkler irrigation is the most suitable method of applying water.
• Chiseling or subsoiling of the claypan can provide temporary benefits from improved water and air movement and root penetration.
• Because of the restricted permeability, proper irrigation management is needed to prevent stand deterioration.
• The depth to rock limits rooting depth, available water capacity, and the efficiency of irrigation.
• Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.

Interpretive Groups

Land capability classification: IVe-3, irrigated and nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Diatomaceous Loam, MAP 14-16 (21e)

143—Datom clay loam, 2 to 9 percent slopes

Setting

Landform: Knolls
Elevation: 4,100 to 4,300 feet
Slope range: 2 to 9 percent
Vegetation: Grasses, big sagebrush, and antelope bitterbrush
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 100 to 120 days

Composition

Datom and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Datom Soil

Parent material: Residuum from diatomaceous earth
Typical profile:
0 to 3 inches—grayish brown clay loam
3 to 12 inches—grayish brown silty clay
12 to 16 inches—light brownish gray silty clay
16 inches—soft diatomaceous earth
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to bedrock: 10 to 20 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Adinot soils, which are less than 20 inches deep to hard bedrock and have less than 35 percent clay in the subsoil; on foot slopes
• Erig soils, which are 40 to 60 inches deep to hard bedrock and have less than 35 percent clay in the subsoil; on toe slopes
• Soils that are more than 20 inches deep; on foot slopes

Use and Management

Land use: Irrigated crops or livestock grazing

Irrigated crops

Common crops: Alfalfa, grass-legume hay, barley, and wheat
Major management factors: Water erosion, slope, surface texture, soil blowing, depth to rock, slow permeability
Management considerations:
• Maintaining a cover of vegetation, such as crop residue and grass, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Limiting tillage for seedbed preparation and weed control helps to control runoff and erosion.
• Sprinkler irrigation is the most suitable method of applying water.
• Unsurfaced roads are slick when wet. They may be impassable during rainy periods.
• Soil blowing can be controlled by keeping the soil rough, using emergency tillage, stripcropping, and establishing windbreaks.
• The depth to rock limits rooting depth, available water capacity, and the efficiency of irrigation.
• Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.

Livestock grazing

Common plants: Rubber rabbitbrush, mountain big sagebrush, bluebunch wheatgrass, basin wildrye
Major management factors: Water erosion, surface texture, soil blowing, depth to rock, frost heaving
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Unsurfaced roads are slick when wet. They may be impassable during rainy periods.
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• Frost heaving forces bunchgrasses and sagebrush above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.

Interpretive Groups

Land capability classification: IVe-3, irrigated and nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Diatomaceous Loam, MAP 14-16 (21e)

144—Dekkas fine sandy loam, 0 to 5 percent slopes

Setting

Landform: Outwash plains
Elevation: 4,600 to 5,000 feet
Slope range: 0 to 5 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 35 to 45 inches
Mean annual air temperature: 39 to 41 degrees F
Mean annual soil temperature: 42 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Dekkas and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Dekkas Soil

Parent material: Outwash from tephra
Typical profile:
0 to 3 inches—brown fine sandy loam
3 to 43 inches—pale brown loamy sand
43 to 54 inches—pale brown gravelly loamy sand
54 to 64 inches—pale brown very gravelly loamy sand
64 to 80 inches—light brown very cobbly sandy clay loam
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability class: Very rapid in the upper part and moderately slow in the lower part
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Slow
Depth to bedrock: Greater than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Soils that have 20 to 70 percent rounded gravel in the profile; in stream channels
• Wengler soils, which have ashy-skeletal material throughout; on toe slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, ponderosa pine, Jeffrey pine, lodgepole pine
Mean site index for stated species: White fir—64; ponderosa pine and Jeffrey pine—108
Dunning site class: 2
CACTOS site index: 72
Common understory plants: Antelope bitterbrush, squawcarpet, greenleaf manzanita, needlegrass, serviceberry

Timber production

Major management factors: Plant competition
Management considerations:
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir, ponderosa pine, and Jeffrey pine.

Interpretive Groups

Land capability classification: IVs-0, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 10S

145—Depner gravelly sandy loam, 15 to 30 percent slopes

Setting

Landform: Lava plateaus and hills
Elevation: 3,200 to 5,000 feet
Slope range: 15 to 30 percent
Vegetation: White fir, ponderosa pine, and shrubs
Mean annual precipitation: 30 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Depner and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Depner Soil

Parent material: Tephra
Typical profile:
2 inches to 0—duff
0 to 16 inches—yellowish brown gravelly sandy loam
16 to 48 inches—brown very cobbly sandy loam and light yellowish brown very cobbly loam
48 inches—weathered volcanic breccia
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

• Mounthat soils, which are 20 to 40 inches deep to weathered bedrock and have cooler soil temperatures at the higher elevations or on north-facing slopes than the Depner soil; on side slopes
• Neer soils, which are 20 to 40 inches deep to hard bedrock; on shoulders
• Obie soils, which have cooler soil temperatures at the higher elevations or on north-facing slopes than the Depner soil; on side slopes
• Ponto and Wyntoon soils, which are more than 60 inches deep; on foot slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fire, ponderosa pine, California black oak, incense cedar, sugar pine, Douglas-fir
Mean site index for stated species: White fir—66; Douglas-fir—116
Dunning site class: 2
CACTOS site index: 74
Common understory plants: Pacific dogwood, wild ginger, gooseberry, serviceberry, princes pine, brackenfern, needlegrass

Timber production

Major management factors: Water erosion, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.

• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir, ponderosa pine, and Douglas-fir.

Interpretive Groups

Land capability classification: IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 10F

146—Depner gravelly sandy loam, 30 to 50 percent slopes

Setting

Landform: Hills
Elevation: 3,200 to 5,000 feet
Slope range: 30 to 50 percent
Vegetation: White fir, ponderosa pine, and shrubs
Mean annual precipitation: 30 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Depner and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Depner Soil

Parent material: Tephra
Typical profile:
2 inches to 0—duff
0 to 16 inches—yellowish brown gravelly sandy loam
16 to 48 inches—brown very cobbly sandy loam and light yellowish brown very cobbly loam
48 inches—weathered volcanic breccia
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Moderate or high

Contrasting Inclusions

• Mounthat soils, which are 20 to 40 inches deep to weathered bedrock and have cooler soil temperatures at the higher elevations or on north-facing slopes than the Depner soil; on side slopes
• Neer soils, which are 20 to 40 inches deep to hard bedrock; on shoulders and summits
• Obie soils, which have cooler soil temperatures at the higher elevations or on north-facing slopes than the Depner soil; on side slopes
• Ponto and Wyntoon soils, which are more than 60 inches deep; on toe slopes
• Areas that have slopes of 15 to 30 percent or 50 to 60 percent

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, Douglas-fir, incense cedar, California black oak, ponderosa pine, sugar pine
Mean site index for stated species: White fir—66; Douglas-fir—116
Dunning site class: 2
CACTOS site index: 74
Common understory plants: Serviceberry, princes pine, brackenfern, needlegrass, wild ginger, Pacific dogwood, gooseberry

Timber production

Major management factors: Water erosion, slope, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• The slope limits the kinds of equipment that can be used in forest management.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter.

Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir, ponderosa pine, and Douglas-fir.

Interpretive Groups

Land capability classification: VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 10R

147—Deven very cobbly loam, 2 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 4,300 to 5,200 feet
Slope range: 2 to 15 percent
Vegetation: Grasses, low sagebrush, and scattered juniper
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Deven and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Deven Soil

Important surface feature: About 30 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Colluvium from extrusive igneous rock
Typical profile:
0 to 4 inches—brown very cobbly loam
4 to 15 inches—dark grayish brown clay loam and brown clay
15 inches—hard tuff
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Slow or medium
Depth to bedrock: 12 to 20 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Adinot soils on side slopes
• Cuppy soils in depressions
• Fiddler soils, which are 20 to 40 inches deep to hard bedrock and have more than 35 percent clay and rock fragments in the subsoil; on side slopes
• Jellycamp soils, which are less than 20 inches deep to a hardpan over hard bedrock and have more than 35 percent clay in the subsoil; on toe slopes
• Longcreek soils, which have more than 35 percent clay and rock fragments in the subsoil; on shoulders
• Soils that are 20 to 30 inches deep to bedrock; on toe slopes
• Soils that have soft, weathered bedrock; on toe slopes

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants: Low sagebrush, Thurber needlegrass, bluebunch wheatgrass
Major management factors: Water erosion, depth to rock, rock fragments on the surface, frost heaving, limited available water capacity
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Frost heaving forces bunchgrasses and sagebrush above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: VIIs, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Shallow Cobbly Loam, MAP 14-16 (21e)

148—Deven very cobbly loam, 15 to 30 percent slopes

Setting

Landform: Lava plateaus
Elevation: 4,300 to 5,200 feet
Slope range: 15 to 30 percent
Vegetation: Grasses, low sagebrush, and scattered juniper
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Deven and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Deven Soil

Important surface feature: About 30 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Colluvium from extrusive igneous rock
Typical profile:
0 to 4 inches—brown very cobbly loam
4 to 15 inches—dark grayish brown clay loam and clay
15 inches—hard tuff
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Rapid
Depth to bedrock: 12 to 20 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

• Adinot soils, which have less than 35 percent clay in the subsoil; on side slopes
• Fiddler soils, which are 20 to 40 inches deep to hard bedrock; on side slopes
• Jellycamp soils, which are less than 20 inches deep to a hardpan over hard bedrock; on foot slopes
• Longcreek soils on side slopes
• Soils that are 20 to 30 inches deep; on foot slopes
• Soils that have soft, weathered bedrock; on foot slopes
• Soils that do not have cobbles on the surface; on foot slopes
• Spring-fed drainageways

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants: Low sagebrush, Thurber needlegrass, bluebunch wheatgrass
Major management factors: Water erosion, depth to rock, rock fragments, limited available water capacity
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: VIIe, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Shallow Cobbly Loam, MAP 14-16 (21e)

149—Deven very cobbly loam, 30 to 50 percent slopes

Setting

Landform: Lava plateaus
Elevation: 4,300 to 5,200 feet
Slope range: 30 to 50 percent
Vegetation: Grasses, low sagebrush, and scattered juniper
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Deven and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Deven Soil

Important surface feature: About 30 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Colluvium from extrusive igneous rock

Typical profile:
0 to 4 inches—brown very cobbly loam
4 to 15 inches—brown clay loam and gravelly clay
15 inches—hard tuff
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Rapid
Depth to bedrock: 12 to 20 inches
Hazard of water erosion in bare areas: Moderate or high

Contrasting Inclusions

• Adinot soils, which are less than 20 inches deep to hard bedrock and have less than 35 percent clay in the subsoil; on side slopes
• Fiddler soils, which are 20 to 40 inches deep and have more than 35 percent clay and rock fragments in the subsoil; on side slopes
• Soils that have more than 35 percent rock fragments in the profile; on back slopes
• Soils that have soft, weathered bedrock; on side slopes

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants: Low sagebrush, Thurber needlegrass, bluebunch wheatgrass
Major management factors: Water erosion, slope, depth to rock, rock fragments, limited available water capacity
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The slope can limit access by equipment and some kinds of livestock. Fencing, water development, and forage supplements can improve livestock distribution.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: VIIe, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Shallow Cobbly Loam, MAP 14-16 (21e)

150—Dosa-Burman complex, 0 to 2 percent slopes

Setting

Landform: Stream terraces
Elevation: 3,200 to 5,500 feet
Slope range: 0 to 2 percent
Vegetation: Rushes, sedges, and grasses
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Dosa and similar soils: 50 percent
Burman and similar soils: 35 percent
Contrasting inclusions: 15 percent

Characteristics of the Dosa Soil

Position on the landscape: Toe slopes
Parent material: Alluvium from lacustrine sediments
Typical profile:
0 to 4 inches—gray silty clay loam
4 to 28 inches—mottled, light brownish gray clay
28 inches—soft diatomaceous earth
Depth class: Moderately deep
Drainage class: Somewhat poorly drained
Slowest permeability class: Slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Ponded
Depth to bedrock: 20 to 40 inches
Water table: At the surface to 30 inches below the surface from December through July; at a depth of 30 to 48 inches from August through November
Kind of water table: Perched
Ponding: 6 inches above the surface from December through April for very long periods
Hazard of water erosion in bare areas: Low

Characteristics of the Burman Soil

Position on the landscape: Foot slopes
Parent material: Alluvium from extrusive igneous rock

Typical profile:
0 to 8 inches—mottled, pale brown loam
8 to 33 inches—mottled, pale brown and brownish yellow clay loam
33 to 39 inches—hardpan
39 to 47 inches—pale brown sandy loam
47 to 72 inches—mottled, light gray silt loam and silty clay loam
Depth class: Moderately deep
Drainage class: Somewhat poorly drained
Slowest permeability class: Slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Ponded
Depth to claypan: 5 to 10 inches
Depth to hardpan: 20 to 40 inches
Depth to bedrock: More than 60 inches
Depth to the water table: 12 to 30 inches from November through June; 30 to 72 inches from July through October
Kind of water table: Perched
Ponding: 6 inches above the surface from December through April for very long periods
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Lasvar soils, which are 20 to 40 inches deep to a hardpan and have clay textures throughout; on toe slopes
• Nosoni soils, which are more than 60 inches deep and have less than 35 percent clay in the subsoil; on foot slopes
• Pitvar soils, which are 40 to 60 inches deep to a hardpan and have clay textures throughout; on toe slopes
• Soils that are similar to the Dosa soil but are 40 to 60 inches deep to diatomite; on foot slopes
• Soils that are similar to the Burman soil but have 35 to 60 percent gravel in the subsoil; near stream channels

Use and Management

Land use: Livestock grazing or wetland wildlife habitat

Livestock grazing

Common plants: Bluegrass, carex, rush, tufted hairgrass, other perennial forbs, bentgrass
Major management factors: Dosa—soil blowing, high water table, surface crusting, limited available water capacity; Burman—soil blowing, high water table, limited available water capacity

Management considerations:
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.
• The high water table saturates the soil in the winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
• The high water table limits the choice of plant species that can be used for seeding. Frequency, intensity, and duration of grazing affect the composition of the plant community.
• Surface crusting can greatly reduce the water infiltration rate and hinder seedling emergence. Livestock can be used to break crusts. Maintaining a cover of vegetation minimizes surface crusting.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.
• Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Wetland wildlife habitat

Management considerations:
• This unit provides important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and applying proper water management techniques promote the reproduction of waterfowl.
• Drainage of wetlands may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: Dosa—Vw-2, nonirrigated; Burman—IVw-2, nonirrigated
MLRA: 22
Prime farmland: Considered prime farmland in irrigated areas that are drained
Range site: Wet Meadow, MAP 20+ (22e)

151—Dotta loam, gravelly substratum, 0 to 2 percent slopes

Setting

Landform: Stream terraces
Elevation: 4,200 to 4,400 feet

Slope range: 0 to 2 percent
Vegetation: Grasses and big sagebrush
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 49 to 54 degrees F
Frost-free period: 100 to 120 days

Composition

Dotta and similar soils: 75 percent
Contrasting inclusions: 25 percent

Characteristics of the Dotta Soil

Parent material: Alluvium from extrusive igneous rock and lacustrine sediments
Typical profile:
0 to 13 inches—dark gray loam
13 to 41 inches—grayish brown and brown sandy clay loam
41 to 68 inches—pale brown gravelly sandy clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very high
Highest shrink-swell potential: Moderate
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Frequency of flooding: Occasional for long periods from December through April
Depth to the water table: 42 to 60 inches from March through May
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• The somewhat poorly drained Chalkford soils near stream channels
• Channeled areas
• The somewhat poorly drained Henhill soils, which have a gravelly subsoil; near stream channels
• The very poorly drained Pastolla soils in stream channels
• Soils that have a water table at a depth of 30 to 40 inches; near stream channels

Use and Management

Land use: Irrigated crops or livestock grazing

Irrigated crops

Common crops: Hay and grain
Major management factors: Soil blowing, flooding, high water table
Management considerations:
• Soil blowing can be controlled by keeping the soil rough, using emergency tillage, stripcropping, and establishing windbreaks.
• The hazard of flooding should be considered before any cropping is done or capital improvements are installed.
• The high water table limits the suitability for deep-rooted crops and can cause crop damage.
• Careful management of irrigation is needed to avoid raising the water table.

Livestock grazing

Common plants: Mountain big sagebrush, beardless wildrye, basin wildrye
Major management factors: Soil blowing, flooding
Management considerations:
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.
• Livestock operations can be impaired by flooding in winter and spring.
• The hazard of flooding should be considered when stand renovation or reestablishment is planned.
• If seeding is desired, species that are adapted to flooding should be considered.
• The high water table enhances forage production and extends the green feed period. If seeding is desired, however, species that are adapted to a high water table should be considered.

Interpretive Groups

Land capability classification: IIIw-4, irrigated and nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland only in irrigated areas
Range site: Deep Loam, MAP 14-16 (21e)

152—Dotta sandy loam, 2 to 5 percent slopes

Setting

Landform: Stream terraces
Elevation: 3,310 to 4,400 feet
Slope range: 2 to 5 percent
Vegetation: Grasses and big sagebrush
Mean annual precipitation: 14 to 20 inches
Mean annual air temperature: 48 to 52 degrees F
Mean annual soil temperature: 49 to 54 degrees F
Frost-free period: 100 to 130 days

Composition

Dotta and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Dotta Soil

Parent material: Alluvium from extrusive igneous rock and lacustrine sediments
Typical profile:
0 to 16 inches—dark grayish brown sandy loam
16 to 47 inches—grayish brown and brown sandy clay loam
47 to 75 inches—pale brown, very pale brown, and light gray sandy loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Esperanza soils, which are more than 60 inches deep and have more than 35 percent clay in the subsoil; on foot slopes
• The somewhat poorly drained Henhill soils, which are more than 60 inches deep; on toe slopes
• Modoc soils, which are 20 to 40 inches deep to a hardpan and have more than 35 percent clay in the subsoil; on mounds
• Soils that are underlain by a hardpan below a depth of 40 inches; on foot slopes
• Soils that are underlain by tuff; on foot slopes
• Soils that have a water table at a depth of 6 feet; near stream channels

Use and Management

Land use: Livestock grazing, irrigated crops, or homesite development

Irrigated crops

Common crops: Hay, grain, potatoes, and strawberry plants
Major management factors: Slope, soil blowing
Management considerations:
• Sprinkler irrigation is the most suitable method of applying water.
• Soil blowing can be controlled by keeping the soil rough, using emergency tillage, stripcropping, and establishing windbreaks.

Livestock grazing

Common plants: Mountain big sagebrush, beardless wildrye, basin wildrye
Major management factors: Soil blowing
Management considerations:
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.

Homesite development

Major management factors: Shrink-swell, restricted permeability
Management considerations:
• The effects of shrinking and swelling can be minimized by using proper engineering designs or backfilling with material that has a low shrink-swell potential.
• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: IIe-1, irrigated, and IIIe-1, nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland only in irrigated areas
Range site: Deep Loam, MAP 14-16 (21e)

153—Dotta sandy loam, 5 to 9 percent slopes

Setting

Landform: Stream terraces
Elevation: 4,100 to 4,500 feet
Slope range: 5 to 9 percent
Vegetation: Grasses and big sagebrush
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 49 to 54 degrees F
Frost-free period: 100 to 120 days

Composition

Dotta and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Dotta Soil

Parent material: Alluvium from extrusive igneous rock and lacustrine sediments

Typical profile:
0 to 17 inches—gray sandy loam
17 to 29 inches—grayish brown sandy clay loam
29 to 72 inches—pale brown sandy loam and very pale brown coarse sandy loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Moderate
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• The somewhat poorly drained Henhill soils; on toe slopes
• Modoc soils, which are 20 to 40 inches deep to a hardpan; on mounds
• Soils that are underlain by tuff; on foot slopes
• Soils that have a water table at a depth of 6 feet; near stream channels
• Soils that have more than 35 percent clay in the subsoil; on toe slopes

Use and Management

Land use: Irrigated crops or livestock grazing

Irrigated crops

Common crops: Hay, grain, and potatoes
Major management factors: Slope, soil blowing
Management considerations:
• Sprinkler irrigation is the most suitable method of applying water.
• Soil blowing can be controlled by keeping the soil rough, using emergency tillage, stripcropping, and establishing windbreaks.

Livestock grazing

Common plants: Mountain big sagebrush, beardless wildrye, basin wildrye
Major management factors: Soil blowing
Management considerations:
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.

Interpretive Groups

Land capability classification: IIe-4, irrigated, and IIIe-4, nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland only in irrigated areas
Range site: Deep Loam, MAP 14-16 (21e)

154—Dotta sandy loam, 9 to 15 percent slopes

Setting

Landform: Stream terraces
Elevation: 4,100 to 4,400 feet
Slope range: 9 to 15 percent
Vegetation: Grasses and big sagebrush
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 49 to 54 degrees F
Frost-free period: 100 to 120 days

Composition

Dotta and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Dotta Soil

Parent material: Alluvium from extrusive igneous rock and lacustrine sediments
Typical profile:
0 to 17 inches—gray sandy loam
17 to 29 inches—grayish brown sandy clay loam
29 to 72 inches—pale brown sandy loam and pale brown and very pale brown coarse sandy loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Moderate
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Soils that have tuff below a depth of 40 inches; on foot slopes
• Soils that have more than 35 percent clay in the subsoil; on toe slopes
• Sweagert soils, which are 20 to 40 inches deep to a hardpan; on shoulders

Use and Management

Land use: Irrigated crops or livestock grazing

Irrigated crops

Common crops: Hay, grain, and potatoes
Major management factors: Water erosion, slope, soil blowing
Management considerations:
• Maintaining a cover of vegetation, such as crop residue and grass, on about 20 percent of the surface

helps to control erosion during periods of intense rainfall and spring snowmelt.
• During periods when the soil is bare, erosion can be controlled by properly managing crop residue or planting a cover crop.
• Limiting tillage for seedbed preparation and weed control helps to control runoff and erosion.
• Sprinkler irrigation is the most suitable method of applying water.
• Soil blowing can be controlled by keeping the soil rough, using emergency tillage, stripcropping, and establishing windbreaks.

Livestock grazing

Common plants: Mountain big sagebrush, beardless wildrye, basin wildrye
Major management factors: Water erosion, soil blowing
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 20 percent of the surface helps to control water erosion during periods of intense rainfall and spring snowmelt and helps to control soil blowing.

Interpretive Groups

Land capability classification: IIIe-1, irrigated and nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Deep Loam, MAP 14-16 (21e)

155—Dotta sandy loam, 15 to 30 percent slopes

Setting

Landform: Stream terraces
Elevation: 4,100 to 4,400 feet
Slope range: 15 to 30 percent
Vegetation: Grasses and big sagebrush
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 49 to 54 degrees F
Frost-free period: 100 to 120 days

Composition

Dotta and similar soils: 90 percent
Contrasting inclusions: 10 percent

Characteristics of the Dotta Soil

Parent material: Alluvium from extrusive igneous rock and lake sediments
Typical profile:
0 to 17 inches—gray sandy loam
17 to 29 inches—grayish brown sandy clay loam
29 to 72 inches—pale brown sandy loam and pale brown and very pale brown coarse sandy loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

• Erig soils, which are 40 to 60 inches deep to hard bedrock; on back slopes
• Soils that have lime at a depth of about 17 inches; on toe slopes
• Soils that are less than 40 inches deep to tuff; on shoulders

Use and Management

Land use: Irrigated crops or livestock grazing

Irrigated crops

Common crops: Hay and grain
Major management factors: Water erosion, slope, soil blowing
Management considerations:
• Maintaining a cover of vegetation, such as crop residue and grass, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• During periods when the soil is bare, erosion can be controlled by properly managing crop residue or planting a cover crop.
• Limiting tillage for seedbed preparation and weed control helps to control runoff and erosion.
• Sprinkler irrigation is the most suitable method of applying water.
• The slope can affect the safe use of cropping equipment.
• All tillage should be on the contour or across the slope.
• Soil blowing can be controlled by keeping the soil rough, using emergency tillage, stripcropping, and establishing windbreaks.

Livestock grazing

Common plants: Mountain big sagebrush, beardless wildrye, basin wildrye
Major management factors: Water erosion, soil blowing

Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt and helps to control soil blowing.

Interpretive Groups

Land capability classification: IVe-1, irrigated and nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Deep Loam, MAP 14-16 (21e)

156—Dotta-Esperanza complex, moist, 0 to 5 percent slopes

Setting

Landform: Stream terraces
Elevation: 2,700 to 2,800 feet
Slope range: 0 to 5 percent
Vegetation: Grasses, scattered Oregon white oak, conifers, and shrubs
Mean annual precipitation: 16 to 18 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 50 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Dotta and similar soils: 45 percent
Esperanza and similar soils: 35 percent
Contrasting inclusions: 20 percent

Characteristics of the Dotta Soil

Position on the landscape: Foot slopes
Parent material: Alluvium from extrusive igneous rock and lacustrine sediments
Typical profile:
0 to 16 inches—dark grayish brown sandy loam
16 to 47 inches—grayish brown and brown sandy clay loam
47 to 75 inches—pale brown, very pale brown, and light gray sandy loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Esperanza Soil

Position on the landscape: Toe slopes
Parent material: Alluvium from tuff, basalt, and diatomite
Typical profile:
0 to 5 inches—dark grayish brown loam
5 to 53 inches—dark grayish brown and brown clay loam and clay
53 to 58 inches—brown, stratified sandy loam to loamy sand
58 to 61 inches—hardpan
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: High
Highest shrink-swell potential: High
Surface runoff: Slow
Depth to hardpan: 40 to 60 inches
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Britton soils, which are less than 20 inches deep to weathered bedrock; on foot slopes
• Jadpor soils, which have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; near stream channels
• Keddie and Nosoni soils, which have less than 35 percent clay in the subsoil; near stream channels

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants on the Dotta soil: Mountain big sagebrush, beardless wildrye, basin wildrye
Common plants on the Esperanza soil: Low sagebrush, beardless wildrye, rubber rabbitbrush, antelope bitterbrush, Lemmon needlegrass
Major management factors: No major management concerns

Interpretive Groups

Land capability classification: Dotta—IIe-4, irrigated, and IIIe-4, nonirrigated; Esperanza—IIe-3, irrigated, and IIIe-3, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Dotta—Deep Loam, MAP 14-16 (21e); Esperanza—Loamy Claypan, MAP 14-18 (21e)

157—Dotta-Ricketts complex, 15 to 30 percent slopes

Setting

Landform: Hills
Elevation: 4,200 to 5,200 feet
Slope range: 15 to 30 percent
Vegetation: Grasses and big sagebrush
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 47 to 49 degrees F
Mean annual soil temperature: 49 to 51 degrees F
Frost-free period: 80 to 100 days

Composition

Dotta and similar soils: 60 percent
Ricketts and similar soils: 30 percent
Contrasting inclusions: 10 percent

Characteristics of the Dotta Soil

Position on the landscape: Toe slopes
Parent material: Alluvium from extrusive igneous rock and lacustrine sediments
Typical profile:
0 to 16 inches—dark grayish brown sandy loam
16 to 47 inches—grayish brown sandy clay loam
47 to 75 inches—pale brown, very pale brown, and light gray sandy loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate

Characteristics of the Ricketts Soil

Position on the landscape: Back slopes
Important surface feature: About 20 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Colluvium from extrusive igneous rock
Typical profile:
0 to 10 inches—brown and dark brown very cobbly loam
10 to 26 inches—dark brown and dark yellowish brown very cobbly loam; about 26 percent clay
26 inches—fractured basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

- Adinot soils, which are less than 20 inches deep to hard bedrock; on shoulders
- Daphnedale soils, which are 20 to 40 inches deep to weathered bedrock and have more than 35 percent clay in the subsoil; on toe slopes
- Oxendine soils, which are less than 20 inches deep to a hardpan; on toe slopes
- Rock outcrop; on shoulders
- Soils that are similar to the Dotta soil but have more than 35 percent rock fragments in the profile; on back slopes
- Soils that are similar to the Ricketts soil but have less than 35 percent rock fragments in the profile; on toe slopes
- Soils that are similar to the Ricketts soil but have soft bedrock; on foot slopes
- Sweagert soils, which are 20 to 40 inches deep to weathered bedrock; on toe slopes

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants on the Dotta soil: Bluebunch wheatgrass, mountain big sagebrush, antelope bitterbrush, Idaho fescue
Common plants on the Ricketts soil: Mountain big sagebrush, antelope bitterbrush, bluebunch wheatgrass, Idaho fescue
Major management factors: Dotta—water erosion; Ricketts—water erosion, rock fragments, limited available water capacity
Management considerations:
- Maintaining a cover of vegetation, such as grass and brush, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
- Because of the limited available water capacity, intensive management of grazing is needed. Grazing frequency and duration are critical to maintenance of the stands.

Interpretive Groups

Land capability classification: Dotta—IVe-1, nonirrigated; Ricketts—IVs-7, nonirrigated
MLRA: 21

Prime farmland: Not considered prime farmland
Range site: Dotta—Cool Deep Loam, MAP 16-18 (21e); Ricketts—Cool Cobbly Loam, MAP 16-18 (21e)

158—Dotta-Searvar complex, 2 to 15 percent slopes

Setting

Landform: Mountains
Elevation: 5,200 to 5,500 feet
Slope range: 2 to 15 percent
Vegetation: Grasses and big sagebrush
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 47 to 48 degrees F
Mean annual soil temperature: 49 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Dotta and similar soils: 40 percent
Searvar and similar soils: 40 percent
Contrasting inclusions: 20 percent

Characteristics of the Dotta Soil

Position on the landscape: Toe slopes
Parent material: Alluvium from extrusive igneous rock and lacustrine sediments
Typical profile:
0 to 12 inches—grayish brown gravelly loam
12 to 54 inches—grayish brown, brown, and light yellowish brown gravelly sandy clay loam and clay loam
54 to 64 inches—gravelly sandy loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Searvar Soil

Position on the landscape: Foot slopes
Parent material: Colluvium from extrusive igneous rock
Typical profile:
0 to 6 inches—grayish brown gravelly loam
6 to 18 inches—brown very cobbly loam
18 to 28 inches—pale brown very cobbly loam
28 to 53 inches—very pale brown, soft andesitic conglomerate
53 inches—tuff
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Longcreek soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent clay and rock fragments in the subsoil; on shoulders
• Orhood soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on shoulders
• Soils that are similar to the Dotta soil but are less than 40 inches deep to bedrock; on back slopes

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants on the Dotta soil: Bluebunch wheatgrass, mountain big sagebrush, antelope bitterbrush, Idaho fescue
Common plants on the Searvar soil: Mountain big sagebrush, antelope bitterbrush, bluebunch wheatgrass, Idaho fescue
Major management factors: Water erosion
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.

Interpretive Groups

Land capability classification: Dotta—IIIe-4; Searvar—IVe-4, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Dotta—Cool Deep Loam, MAP 16-18 (21e); Searvar—Cool Cobbly Loam, MAP 16-18 (21e)

159—Dudgen-Graven complex, 0 to 5 percent slopes

Setting

Landform: Stream terraces

Elevation: 3,310 to 3,320 feet
Slope range: 0 to 5 percent
Vegetation: Grasses and low sagebrush (fig. 4)
Mean annual precipitation: 16 to 18 inches
Mean annual air temperature: 50 to 52 degrees F
Mean annual soil temperature: 52 to 54 degrees F
Frost-free period: 120 to 130 days

Composition

Dudgen and similar soils: 50 percent
Graven and similar soils: 40 percent
Contrasting inclusions: 10 percent

Characteristics of the Dudgen Soil

Position on the landscape: Intermounds
Parent material: Alluvium from extrusive igneous rock
Slope: 0 to 2 percent
Typical profile:
0 to 4 inches—light brownish gray loam
4 to 8 inches—light brownish gray clay loam
8 to 15 inches—brown clay
15 to 19 inches—hardpan
19 to 37 inches—light gray, stratified sandy loam to silt loam
37 to 99 inches—light gray, stratified loamy sand to sandy loam
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Ponded
Depth to claypan: 2 to 5 inches
Depth to hardpan: 10 to 20 inches
Depth to bedrock: More than 60 inches
Depth to the water table: 18 to 48 inches from March through May; 48 to 72 inches from June through February
Kind of water table: Perched
Ponding: 6 inches above the surface from January through March for brief periods
Hazard of water erosion in bare areas: Low

Characteristics of the Graven Soil

Position on the landscape: Mounds
Parent material: Alluvium from extrusive igneous rock
Slope: 2 to 5 percent
Typical profile:
0 to 14 inches—grayish brown silt loam
14 to 23 inches—grayish brown and brown clay
23 to 29 inches—hardpan
29 to 35 inches—light brownish gray, stratified sandy loam to silt loam
35 to 64 inches—pinkish gray, stratified loamy sand to silt loam
Depth class: Moderately deep
Drainage class: Moderately well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: High
Surface runoff: Slow
Depth to claypan: 5 to 15 inches
Depth to hardpan: 20 to 40 inches
Depth to bedrock: More than 60 inches
Depth to the water table: 36 to 48 inches from December through March; 48 to 72 inches from April through November
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Cupvar soils, which are 20 to 40 inches deep to a hardpan and have clay throughout; in intermounds
• Dotta soils, which are more than 60 inches deep and have less than 35 percent clay in the subsoil; on foot slopes
• Pit soils, which are more than 60 inches deep and have clay throughout; in intermounds

Use and Management

Land use: Livestock grazing, irrigated crops, homesite development, or wetland wildlife habitat

Livestock grazing

Common plants: Bottlebrush squirreltail, low sagebrush, bluegrass
Major management factors: Dudgen—cemented pan, frost heaving, limited available water capacity; Graven—surface crusting
Management considerations:
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Surface crusting can greatly reduce the water infiltration rate and hinder seedling emergence. Livestock can be used to break crusts. Maintaining a cover of vegetation minimizes surface crusting.
• Frost heaving forces bunchgrasses and sagebrush above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.
• Because of the limited available water capacity, intensive management is necessary. Grazing frequency and duration are critical to maintenance of the stands.

• Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Irrigated crops

Common crops: Alfalfa, grass-legume hay, barley, wheat, and wild rice
Major management factors: Dudgen—depth to the claypan, cemented pan, ponding, slow permeability; Graven—slope, depth to the claypan, cemented pan, high water table, surface crusting, slow permeability
Management considerations:
• Sprinkler irrigation is the most suitable method of applying water.
• Chiseling or subsoiling of the claypan can provide temporary benefits from improved water and air movement and root penetration.
• Applying irrigation water slowly but for longer periods helps to prevent oxygen depletion in the surface horizons.
• On soils that have a cemented pan, intensive management of irrigation water is needed to prevent the buildup of a perched water table. Ripping or subsoiling can permanently enhance the root environment.
• Soil wetness or ponding can limit the selection of crops, the period during which tillage can be accomplished, and the use of equipment.
• The high water table limits the suitability for deep-rooted crops or can cause crop damage.
• Careful management of irrigation is needed to avoid raising the water table.
• Surface crusting can greatly reduce the water infiltration rate and hinder seedling emergence. Crusting can be minimized by returning crop residue to the soil and using frequent, light applications of irrigation water.
• Because of the restricted permeability, an irrigation design that includes low application rates and a longer application period is needed.

Homesite development

Major management factors: Dudgen—cemented pan, wetness; Graven—cemented pan, wetness, shrink-swell
Management considerations:
• Because of wetness during the winter and early spring, a drainage system should be installed around the foundation.
• The effects of shrinking and swelling can be minimized by using proper engineering designs or backfilling with material that has a low shrink-swell potential.
• The cemented pan reduces the volume of soil that is available for filtering effluent. Tests should be made below the pan depth to determine whether the lines should be placed at this depth.
• The high water table limits the absorption capacity of the leach field. A mounded septic system or other specialized leach field can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Wetland wildlife habitat

Management considerations:
• This unit provides important habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
• Drainage of wetlands in areas of this unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: Dudgen—IVe-3, irrigated and nonirrigated; Graven—IIIe-4, irrigated and nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland only in irrigated areas
Range site: Dudgen and Graven—Shallow Loam, MAP 14-18 (21e)

160—Dudgen-Graven complex, flooded, 0 to 5 percent slopes

Setting

Landform: Stream terraces
Elevation: 3,310 to 3,320 feet
Slope range: 0 to 5 percent
Vegetation: Grasses and low sagebrush
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 50 to 52 degrees F
Mean annual soil temperature: 52 to 54 degrees F
Frost-free period: 120 to 130 days

Composition

Dudgen and similar soils: 50 percent

Graven and similar soils: 40 percent
Contrasting inclusions: 10 percent

Characteristics of the Dudgen Soil

Position on the landscape: Intermounds
Parent material: Alluvium from extrusive igneous rock
Slope: 0 to 2 percent
Typical profile:
0 to 5 inches—pale brown loam
5 to 11 inches—brown clay loam
11 to 16 inches—brown clay
16 to 19 inches—hardpan
19 to 60 inches—stratified loamy sand to sandy loam
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: High
Surface runoff: Ponded
Depth to claypan: 2 to 5 inches
Depth to hardpan: 10 to 20 inches
Depth to bedrock: More than 60 inches
Frequency of flooding: Occasional for brief periods from December through March
Water table: At the surface to 18 inches below the surface from December through March; at a depth of 18 to 48 inches from March through April; at a depth of 48 to 72 inches from May through October
Kind of water table: Perched
Ponding: 6 inches above the surface from December through February for brief periods
Hazard of water erosion in bare areas: Low

Characteristics of the Graven Soil

Position on the landscape: Mounds
Parent material: Alluvium from extrusive igneous rock
Slope: 2 to 5 percent
Typical profile:
0 to 2 inches—grayish brown silt loam
2 to 12 inches—grayish brown and brown clay loam
12 to 20 inches—very pale brown clay loam
20 to 24 inches—hardpan
24 to 60 inches—stratified loamy sand to silt loam
Depth class: Moderately deep
Drainage class: Moderately well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: High
Surface runoff: Slow
Depth to claypan: 5 to 15 inches
Depth to hardpan: 20 to 40 inches
Depth to bedrock: More than 60 inches
Frequency of flooding: Occasional for brief periods from January through April
Depth to the water table: 6 to 42 inches from December through March
Kind of water table: Perched
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

- Cupvar soils, which are 20 to 40 inches deep to a hardpan and have clay textures throughout; in intermounds
- Dotta soils, which are more than 60 inches deep and have less than 35 percent clay in the subsoil; on foot slopes
- Pit soils, which are more than 60 inches deep and have clay textures throughout; in intermounds
- Soils that are shallow to diatomaceous earth; on foot slopes
- Soils that are similar to the Dudgen soil but have less than 35 percent clay in the subsoil; in intermounds

Use and Management

Land use: Livestock grazing, irrigated crops, homesite development, or wetland wildlife habitat

Livestock grazing

Common plants: Bottlebrush squirreltail, low sagebrush, bluegrass
Major management factors: Dudgen—cemented pan, flooding, ponding, high water table, frost heaving; Graven—flooding, high water table, surface crusting
Management considerations:
- Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
- Livestock operations can be impaired by flooding and ponding in winter and spring.
- The flooding and the ponding should be considered when stand renovation or reestablishment is planned.
- The high water table saturates the soil in the winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
- Surface crusting can greatly reduce the water infiltration rate and hinder seedling emergence. Livestock can be used to break crusts. Maintaining a cover of vegetation minimizes surface crusting.
- Frost heaving forces bunchgrasses and sagebrush above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.

• Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Irrigated crops

Common crops: Alfalfa, grass-legume hay, barley, wheat, and wild rice
Major management factors: Dudgen—depth to the claypan, cemented pan, flooding, ponding, high water table, slow permeability; Graven—slope, depth to the claypan, cemented pan, flooding, high water table, surface crusting, slow permeability
Management considerations:
• Sprinkler irrigation is the most suitable method of applying water.
• Chiseling or subsoiling of the claypan can provide temporary benefits from improved water and air movement and root penetration.
• Because of the restricted permeability, proper irrigation management is needed to prevent stand deterioration.
• On soils that have a cemented pan, intensive management of irrigation water is needed to prevent the buildup of a perched water table. Ripping or subsoiling can permanently enhance the root environment.
• The hazard of flooding should be considered before any cropping is done or capital improvements are installed.
• Soil wetness or ponding can limit the selection of crops, the period during which tillage can be accomplished, and the use of equipment.
• The high water table can damage deep-rooted crops.
• Careful management of irrigation is needed to avoid raising the water table.
• Surface crusting can greatly reduce the water infiltration rate and hinder seedling emergence. Crusting can be minimized by returning crop residue to the soil and using frequent, light applications of irrigation water.
• Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.

Homesite development

Major management factors: Dudgen—cemented pan, flooding, wetness; Graven—cemented pan, flooding, wetness, shrink-swell
Management considerations:
• Flooding can occur during the winter and early spring months. The foundation should be taller than normal, or the buildings should be located at the highest elevations. Water should be intercepted by drainage ditches, or a drainage system should be installed around the foundation.
• The effects of shrinking and swelling can be minimized by using proper engineering designs or backfilling with material that has a low shrink-swell potential.
• The cemented pan reduces the volume of soil that is available for filtering effluent. Tests should be made below the pan depth to determine whether the lines should be placed at this depth.
• Flooding can add water to the septic system. Diversion of floodwater helps to overcome this limitation.
• The high water table limits the absorption capacity of the leach field. A mounded leach field or other specialized leach field can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Wetland wildlife habitat

Management considerations:
• This unit can provide important habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
• Drainage of wetlands in areas of this map unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: Dudgen—IVw-2, irrigated and nonirrigated; Graven—IIIe-8, irrigated and nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland only in irrigated areas
Range site: Dudgen and Graven—Shallow Loam, MAP 14-18 (21e)

161—Esperanza sandy loam, 2 to 5 percent slopes

Setting

Landform: Stream terraces
Elevation: 3,500 to 5,000 feet
Slope range: 2 to 5 percent
Vegetation: Grasses and sagebrush (fig. 5)
Mean annual precipitation: 16 to 18 inches

Mean annual air temperature: 48 to 52 degrees F
Mean annual soil temperature: 52 to 54 degrees F
Frost-free period: 120 to 130 days

Composition

Esperanza and similar soils: 75 percent
Contrasting inclusions: 25 percent

Characteristics of the Esperanza Soil

Parent material: Alluvium from tuff, basalt, and diatomaceous earth
Typical profile:
0 to 6 inches—grayish brown and brown sandy loam
6 to 30 inches—brown clay loam and yellowish brown clay
30 to 44 inches—light yellowish brown sandy clay loam
44 to 58 inches—very pale brown sandy loam
58 to 61 inches—hardpan
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Moderate
Highest shrink-swell potential: High
Surface runoff: slow
Depth to hardpan: 40 to 60 inches
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Dudgen soils, which are less than 20 inches deep to a hardpan; in intermounds
• Graven soils, which are 20 to 40 inches deep to a hardpan; on mounds
• Pittville soils, which are more than 60 inches deep and have less than 35 percent clay in the subsoil; on foot slopes

Use and Management

Land use: Livestock grazing, irrigated crops, or homesite development

Livestock grazing

Common plants: Low sagebrush, beardless wildrye, rubber rabbitbrush, antelope bitterbrush, Lemmon needlegrass
Major management factors: Soil blowing
Management considerations:
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.

Irrigated crops

Common crops: Alfalfa, grass-legume hay, barley, and wheat
Major management factors: Slope, soil blowing, slow permeability
Management considerations:
• Sprinkler irrigation is the most suitable method of applying water.
• Soil blowing can be controlled by keeping the soil rough, using emergency tillage, stripcropping, and establishing windbreaks.
• Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.

Homesite development

Major management factors: Restricted permeability
Management considerations:
• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases or regulations change, a community disposal system may be needed.

Interpretive Groups

Land capability classification: IIe-3, irrigated, and IIIe-3, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Loamy Claypan, MAP 14-18 (21e)

162—Esperanza loam, 0 to 2 percent slopes

Setting

Landform: Stream terraces
Elevation: 3,200 to 3,800 feet
Slope range: 0 to 2 percent
Vegetation: Shrubs and grasses
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 50 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Esperanza and similar soils: 90 percent
Contrasting inclusions: 10 percent

Characteristics of the Esperanza Soil

Parent material: Alluvium from tuff, basalt, and diatomaceous earth
Typical profile:
0 to 5 inches—dark grayish brown loam
5 to 30 inches—dark grayish brown and dark brown clay loam and clay

30 to 53 inches—brown clay loam
53 to 58 inches—brown, stratified sandy loam
58 to 60 inches—hardpan
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: High
Highest shrink-swell potential: High
Surface runoff: Slow
Depth to claypan: 10 to 20 inches
Depth to hardpan: 40 to 60 inches
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Cupvar soils, which are 20 to 40 inches deep to a hardpan; on toe slopes
• Pittville soils, which are more than 60 inches deep and have less than 35 percent clay in the subsoil; on foot slopes
• Soils that have a subsoil of gravelly sandy loam; near stream channels
• Soils that have segregated lime in the lower part; on foot slopes

Use and Management

Land use: Irrigated crops or livestock grazing

Irrigated crops

Common crops: Alfalfa, grass-legume hay, barley, and wheat
Major management factors: Depth to the claypan, slow permeability
Management considerations:
• Chiseling or subsoiling of the claypan can provide temporary benefits from improved water and air movement and root penetration.
• Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.

Livestock grazing

Common plants: Beardless wildrye, rubber rabbitbrush, low sagebrush, antelope bitterbrush, Lemmon needlegrass
Major management factors: No major management concerns

Interpretive Groups

Land capability classification: IIs-3, irrigated, and IIIs-3, nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland only in irrigated areas
Range site: Loamy Claypan, MAP 14-18 (21e)

163—Esro silt loam, gravelly substratum, 0 to 2 percent slopes

Setting

Landform: Basins
Elevation: 6,000 to 6,200 feet
Slope range: 0 to 2 percent
Vegetation: Rushes, sedges, and grasses
Mean annual precipitation: 20 to 25 inches
Mean annual air temperature: 41 to 45 degrees F
Mean annual soil temperature: 38 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Esro and similar soils: 90 percent
Contrasting inclusions: 10 percent

Characteristics of the Esro Soil

Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 22 inches—dark grayish brown and dark gray silt loam
22 to 40 inches—grayish brown silty clay loam
40 to 43 inches—light gray sandy clay loam
43 to 60 inches—light gray very gravelly sandy clay loam
Depth class: Very deep
Drainage class: Very poorly drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Very slow
Depth to bedrock: More than 60 inches
Frequency of flooding: Occasional for long periods from January through April
Water table: At the surface to 24 inches below the surface from December through August
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Channeled areas
• The well drained Ricketts soils, which are 20 to 40 inches deep to hard bedrock; on foot slopes
• Soils that have a water table below a depth of 40 inches; on foot slopes
• Soils that have clay textures throughout; on toe slopes
• The moderately well drained Sweagert soils, which are 20 to 40 inches deep to weathered bedrock; on foot slopes

Use and Management

Land use: Livestock grazing or wetland wildlife habitat

Livestock grazing

Common plants: Rush, carex, bentgrass, tufted hairgrass, bluegrass, other perennial forbs
Major management factors: Flooding, high water table, surface crusting
Management considerations:
• Livestock operations can be impaired by flooding in winter and spring.
• The flooding and the high water table should be considered when stand renovation or reestablishment is planned.
• The high water table limits the choice of plant species and increases the risk of invasion of hydrophytic plants.
• If seeding is desired, species that are adapted to flooding and a high water table should be selected.
• The high water table saturates the soil in the winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
• Surface crusting can greatly reduce the water infiltration rate and hinder seedling emergence. Livestock can be used to break crusts. Maintaining a cover of vegetation minimizes surface crusting.
• Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Wetland wildlife habitat

Management considerations:
• This unit can provide important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
• Drainage of wetlands in areas of this unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: Vw-2, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Range site: Wet Meadow, MAP 20+ (22e)

164—Etsel-Neuns complex, 50 to 75 percent slopes

Setting

Landform: Mountains
Elevation: 3,800 to 4,500 feet
Slope range: 50 to 75 percent
Vegetation: Shrubs, grasses, and trees
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 45 to 47 degrees F
Mean annual soil temperature: 50 to 52 degrees F
Frost-free period: 110 to 130 days

Composition

Etsel and similar soils: 45 percent
Neuns and similar soils: 35 percent
Contrasting inclusions: 20 percent

Characteristics of the Etsel Soil

Position on the landscape: Shoulders
Parent material: Colluvium from metasedimentary rock
Typical profile:
0 to 2 inches—dark yellowish brown very gravelly sandy loam
2 to 9 inches—pale brown very gravelly sandy loam
9 inches—metasedimentary rock
Depth class: Very shallow
Drainage class: Somewhat excessively drained
Slowest permeability class: Moderate
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Very rapid
Depth to bedrock: 4 to 14 inches
Hazard of water erosion in bare areas: Very high

Characteristics of the Neuns Soil

Position on the landscape: Back slopes
Parent material: Slope alluvium from metasedimentary rock
Typical profile:
3 inches to 0—duff
0 to 7 inches—dark grayish brown and yellowish brown gravelly sandy loam
7 to 32 inches—yellowish brown very gravelly sandy loam and light yellowish brown very gravelly loam
32 inches—metasedimentary rock
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderate

Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Very rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: High or very high

Contrasting Inclusions

• Kindig soils, which are 40 to 60 inches deep to weathered bedrock; on back slopes
• Rock outcrop; on shoulders
• Soils that are similar to the Etsel soil but are more than 20 inches deep to hard bedrock; on back slopes
• Soils that are similar to the Etsel soil but have less than 35 percent rock fragments in the profile; on back slopes

Use and Management

Land use: Timber production or homesite development

Woodland vegetation on the Etsel soil

Main tree species: California scrub oak
Common understory plants: Sierra chinkapin, western chokecherry, greenleaf manzanita

Woodland vegetation on the Neuns soil

Main tree species: Ponderosa pine, California black oak, incense cedar, sugar pine, Douglas-fir
Mean site index for stated species: Ponderosa pine—103; Douglas-fir—100
Dunning site class: 3
CACTOS site index: 59
Common understory plants: Greenleaf manzanita, squawcarpet, Pacific dogwood, snowberry, Sierra chinkapin, whitethorn ceanothus, deerbrush

Timber production

Major management factors: Etsel—water erosion, very rapid runoff, slope, depth to rock, limited available water capacity, plant competition; Neuns—water erosion, very rapid runoff, slope, depth to rock, rock fragments, limited available water capacity, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Maintaining the understory vegetation is essential in controlling erosion.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• The very rapid runoff rate can result in severe erosion if water is allowed to concentrate in bare areas, such as skid trails or roads.
• Using conventional harvesting methods is difficult because of the slope.
• The slope limits the use of wheeled and tracked equipment in skidding operations. End lining generally causes less disturbance of the soil.
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
• Depth to rock and rock fragments in the profile hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include ponderosa pine.

Homesite development

Major management factors: Water erosion, slope, depth to rock
Management considerations:
• Maintaining a cover of vegetation on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• During construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.
• The bedrock can make a good base for the foundation.
• Frequent irrigation cycles and controlled application rates are needed to maintain vegetation.
• If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.
• The limited depth to rock inhibits the filtering capacity of the leach fields or can prevent their

placement. If the leach lines are placed too close to the bedrock, ground water may be contaminated by the effluent.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Etsel and Neuns—VIIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Neuns—8R

165—Fiddler-Deven complex, 15 to 30 percent slopes

Setting

Landform: Hills
Elevation: 4,300 to 5,200 feet
Slope range: 15 to 30 percent
Vegetation: Grasses, sagebrush, and scattered juniper
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Fiddler and similar soils: 45 percent
Deven and similar soils: 35 percent
Contrasting inclusions: 20 percent

Characteristics of the Fiddler Soil

Position on the landscape: Side slopes
Important surface feature: About 20 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Colluvium from extrusive igneous rock
Typical profile:
0 to 5 inches—dark grayish brown very cobbly loam
5 to 31 inches—brown very cobbly clay loam and very cobbly clay
31 inches—hard basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to claypan: 7 to 10 inches
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Moderate

Characteristics of the Deven Soil

Position on the landscape: Side slopes
Important surface feature: 30 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Colluvium from extrusive igneous rock
Typical profile:
0 to 4 inches—brown very cobbly loam
4 to 15 inches—brown clay loam and brown gravelly clay
15 inches—hard tuff
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Rapid
Depth to bedrock: 12 to 20 inches
Hazard of water erosion in bare areas: Moderate or high

Contrasting Inclusions

• Longcreek soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent clay and rock fragments in the subsoil; on side slopes
• Rock outcrop; on shoulders
• Soils that are similar to the Deven soil but have soft, weathered bedrock; on foot slopes
• Soils that are similar to the Fiddler soil but are more than 40 inches deep to bedrock; on foot slopes

Use and Management

Land use: Wood products on the Fiddler soil; livestock grazing on both soils

Woodland vegetation on the Fiddler soil

Main woodland species: Western juniper
Mean site index for stated species: Western juniper—20
Common understory plants: Bluebunch wheatgrass, Idaho fescue, needlegrass, mountain big sagebrush, antelope bitterbrush, rubber rabbitbrush

Vegetation on the Deven soil

Common plants: Low sagebrush, Thurber needlegrass, bluebunch wheatgrass

Wood products

Major management factors: Rock fragments, compaction hazard, fine subsoil

Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 50 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The rock fragments in the profile hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The rock fragments on the surface can interfere with harvesting of wood products.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The high clay content in the subsoil can reduce trafficability during wet periods. Roads should be graveled or surfaced for all-weather use.
• The exposed subsoil hinders root penetration and elongation and thus results in poor plant growth.

Livestock grazing

Major management factors: Fiddler—water erosion, rock fragments on the surface; Deven—water erosion, depth to rock, rock fragments on the surface, limited available water capacity
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 50 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: Fiddler—VIs, nonirrigated; Deven—VIIe, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Fiddler—1X
Range site: Fiddler—Stony Loam, MAP 14-18 (21e); Deven—Shallow Cobbly Loam, MAP 14-18 (21e)

166—Fiddler-Deven complex, 30 to 50 percent slopes

Setting

Landform: Hills
Elevation: 4,300 to 5,200 feet
Slope range: 30 to 50 percent
Vegetation: Grasses, sagebrush, and scattered juniper
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Fiddler and similar soils: 45 percent
Deven and similar soils: 35 percent
Contrasting inclusions: 20 percent

Characteristics of the Fiddler Soil

Position on the landscape: Side slopes
Important surface feature: About 20 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Colluvium from extrusive igneous rock
Typical profile:
0 to 5 inches—dark grayish brown very cobbly loam
5 to 31 inches—brown very cobbly clay loam and very cobbly clay
31 inches—hard basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to claypan: 7 to 10 inches
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Moderate or high

Characteristics of the Deven Soil

Position on the landscape: Side slopes
Important surface feature: About 30 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Colluvium from extrusive igneous rock
Typical profile:
0 to 4 inches—brown very cobbly loam

4 to 15 inches—brown clay loam and clay
15 inches—hard tuff
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Rapid
Depth to bedrock: 12 to 20 inches
Hazard of water erosion in bare areas: Moderate or high

Contrasting Inclusions

• Adinot soils, which are less than 20 inches deep to hard bedrock and have less than 35 percent clay in the subsoil; on side slopes
• Rock outcrop; on shoulders
• Soils that are similar to the Deven soil but have more than 35 percent rock fragments throughout; on back slopes
• Soils that are similar to the Deven soil but have soft, weathered bedrock; on side slopes
• Soils that are similar to the Fiddler soil but are more than 40 inches deep to bedrock; on back slopes

Use and Management

Land use: Wood products or grazing

Woodland vegetation on the Fiddler soil

Main woodland species: Western juniper
Mean site index for stated species: Western juniper—20
Common understory plants: Mountain big sagebrush, antelope bitterbrush, bluebunch wheatgrass, Idaho fescue, needlegrass, rubber rabbitbrush

Woodland vegetation on the Deven soil

Main woodland species: Western juniper
Mean site index for stated species: Western juniper—20
Common understory plants: Thurber needlegrass, low sagebrush, bluebunch wheatgrass

Wood products

Major management factors: Fiddler—water erosion, slope, depth to the claypan, rock fragments, compaction hazard, fine subsoil; Deven—water erosion, slope, depth to rock, rock fragments, compaction hazard, fine subsoil
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• Roads and trails can be protected from erosion by constructing water bars.
• The slope limits the use of wheeled and tracked equipment for harvesting wood products, such as firewood and fence posts.
• The depth to rock and the rock fragments hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The rock fragments on the surface can interfere with harvesting wood products.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The high clay content in the subsoil can reduce trafficability during wet periods. Roads should be graveled or surfaced for all-weather use.
• The exposed subsoil hinders root penetration and elongation and thus results in poor plant growth.

Woodland grazing

Major management factors: Fiddler—water erosion, slope, rock fragments; Deven—water erosion, slope, depth to rock, rock fragments, limited available water capacity
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The slope and the rock fragments on the surface can limit access by equipment and some kinds of livestock. Fencing, water development, and forage supplements can improve livestock distribution. If seeding is desired, broadcast methods should be considered.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: Fiddler—VIe, nonirrigated; Deven—VIIe, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Fiddler—1R
Range site: Fiddler—Stony Loam, MAP 14-18 (21e); Deven—Shallow Cobbly Loam, MAP 14-16 (21e)

167—Fiddler-Whitinger complex, 5 to 15 percent slopes

Setting

Landform: Hills
Elevation: 4,000 to 5,000 feet
Slope range: 5 to 15 percent
Vegetation: Grasses, big sagebrush, and scattered juniper
Mean annual precipitation: 16 to 18 inches
Mean annual air temperature: 45 to 47 degrees F
Mean annual soil temperature: 50 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Fiddler and similar soils: 50 percent
Whitinger and similar soils: 40 percent
Contrasting inclusions: 10 percent

Characteristics of the Fiddler Soil

Position on the landscape: Foot slopes
Important surface feature: About 20 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Colluvium from extrusive igneous rock
Typical profile:
0 to 5 inches—dark grayish brown very cobbly loam
5 to 31 inches—brown very cobbly clay loam and very cobbly clay
31 inches—hard basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to claypan: 7 to 10 inches
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Whitinger Soil

Position on the landscape: Toe slopes
Important surface feature: About 5 to 10 percent of the surface is covered with stones and cobbles.
Parent material: Colluvium from basalt
Typical profile:
0 to 10 inches—brown stony loam
10 to 30 inches—brown very cobbly clay loam and very stony clay loam
30 inches—hard basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Orhood soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on shoulders
• Ricketts soils, which are 20 to 40 inches deep to hard bedrock and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on foot slopes
• Sweagert soils, which are 20 to 40 inches deep to a hardpan; on toe slopes

Use and Management

Land use: Wood products, grazing, or homesite development

Woodland vegetation on the Fiddler soil

Main woodland species: Western juniper
Mean site index for stated species: Western juniper—20
Common understory plants: Rubber rabbitbrush, mountain big sagebrush, Thurber needlegrass, bluebunch wheatgrass

Woodland vegetation on the Whitinger soil

Main woodland species: Western juniper
Mean site index for stated species: Western juniper—25
Common understory plants: Rubber rabbitbrush, mountain big sagebrush, Thurber needlegrass, bluebunch wheatgrass

Wood products

Major management factors: Fiddler—water erosion, rock fragments, compaction hazard, limited available water capacity; Whitinger—water erosion, rock fragments, compaction hazard

Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 30 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The rock fragments in the profile hinder planting efforts in areas where the subsoil is exposed or disturbed.
• The rock fragments on the surface can interfere with the harvesting of wood products.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The limited available water capacity hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.

Woodland grazing

Major management factors: Fiddler—water erosion, rock fragments on the surface; Whitinger—water erosion
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 30 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The rock fragments on the surface limit access by equipment and by some kinds of livestock. If seeding is desired, broadcast methods should be considered.

Homesite development

Major management factors: Water erosion, slope, depth to rock, large stones, restricted permeability
Management considerations:
• Maintaining a permanent cover of vegetation on about 30 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• During construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.
• Because of the large stones, digging the trenches for the foundation may be difficult. If too many large stones are on the surface, hand digging may be necessary. Any stones larger than the trench width can be left in place.
• If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.
• The shallow depth to rock inhibits the filtering capacity of the leach fields or can prevent their placement. If the leach lines are placed too close to the bedrock, ground water may be contaminated by the effluent.
• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Fiddler and Whitinger—VIs, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Fiddler—1X; Whitinger—2X
Range site: Fiddler and Whitinger—Stony Loam, MAP 14-18 (21e)

168—Fiddler-Whitinger complex, 15 to 30 percent slopes

Setting

Landform: Hills
Elevation: 4,000 to 5,000 feet
Slope range: 15 to 30 percent
Vegetation: Grasses, big sagebrush, and scattered juniper
Mean annual precipitation: 16 to 18 inches
Mean annual air temperature: 45 to 47 degrees F
Mean annual soil temperature: 50 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Fiddler and similar soils: 50 percent
Whitinger and similar soils: 40 percent
Contrasting inclusions: 10 percent

Characteristics of the Fiddler Soil

Position on the landscape: Back slopes
Important surface feature: About 20 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Colluvium from extrusive igneous rock
Typical profile:
0 to 5 inches—dark grayish brown very cobbly loam
5 to 31 inches—brown very cobbly clay loam and very cobbly clay

31 inches—hard basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to claypan: 7 to 10 inches
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Moderate

Characteristics of the Whitinger Soil

Position on the landscape: Side slopes
Important surface feature: About 5 to 10 percent of the surface is covered with stones and cobbles.
Parent material: Colluvium from basalt
Typical profile:
0 to 10 inches—brown stony loam
10 to 35 inches—brown very cobbly clay loam and very stony clay loam
35 inches—hard basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Moderate or high

Contrasting Inclusions

• Orhood soils, which are less than 20 inches deep to hard bedrock; on shoulders
• Ricketts soils, which are 20 to 40 inches deep to hard bedrock; on back slopes
• Sweagert soils, which are 20 to 40 inches deep to a hardpan; on foot slopes

Use and Management

Land use: Wood products, grazing, or homesite development

Woodland vegetation on the Fiddler soil

Main woodland species: Western juniper
Mean site index for stated species: Western juniper—20
Common understory plants: Rubber rabbitbrush, mountain big sagebrush, Thurber needlegrass, bluebunch wheatgrass

Woodland vegetation on the Whitinger soil

Main woodland species: Western juniper
Mean site index for stated species: Western juniper—25
Common understory plants: Rubber rabbitbrush, mountain big sagebrush, Thurber needlegrass, bluebunch wheatgrass

Wood products

Major management factors: Fiddler—rock fragments, compaction hazard, limited available water capacity; Whitinger—rock fragments, compaction hazard
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 50 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The rock fragments in the profile hinder planting efforts in areas where the subsoil is exposed or disturbed.
• The rock fragments on the surface can interfere with the harvesting of wood products.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The limited available water capacity hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.

Woodland grazing

Major management factors: Fiddler—water erosion, rock fragments on the surface; Whitinger—water erosion
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 50 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The rock fragments on the surface limit access by equipment and by some kinds of livestock. If seeding is desired, broadcast methods should be considered.

Homesite development

Major management factors: Water erosion, slope, depth to rock, large stones, restricted permeability
Management considerations:
• Maintaining a permanent cover of vegetation on about 50 percent of the surface helps to control

erosion during periods of intense rainfall and spring snowmelt.
• During construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.
• Because of the large stones, digging trenches for the foundation may be difficult. If too many large stones are on the surface, hand digging may be necessary.
• If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.
• The shallow depth to rock inhibits the filtering capacity of the leach fields or can prevent their placement. If the leach lines are placed too close to the bedrock, ground water may be contaminated by the effluent.
• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Fiddler and Whitinger—VIs, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Fiddler—1X; Whitinger—2X
Range site: Fiddler and Whitinger—Stony Loam, MAP 14-18 (21e)

169—Gardens-Jacksback complex, 0 to 2 percent slopes

Setting

Landform: Basins and stream terraces
Elevation: 4,700 to 5,000 feet
Slope range: 0 to 2 percent
Vegetation: Gardens—grasses and forbs; Jacksback—lodgepole pine, shrubs, and grasses
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 39 to 41 degrees F
Mean annual soil temperature: 41 to 45 degrees F
Frost-free period: 50 to 80 days

Composition

Gardens and similar soils: 60 percent
Jacksback and similar soils: 35 percent
Contrasting inclusions: 5 percent

Characteristics of the Gardens Soil

Position on the landscape: Toe slopes
Parent material: Alluvium from mixed extrusive igneous rock
Typical profile:
0 to 3 inches—mottled, grayish brown loam
3 to 7 inches—mottled, grayish brown clay loam
7 to 15 inches—mottled, pale brown sandy clay loam
15 to 30 inches—mottled, very pale brown sandy clay loam and mottled, light gray sandy loam
30 to 33 inches—mottled, light brownish gray and mottled, brown very gravelly sandy loam
33 to 62 inches—mottled, light gray and mottled, very pale brown, stratified fine sandy loam to sandy clay loam
Depth class: Very deep
Drainage class: Poorly drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Ponded
Depth to bedrock: More than 60 inches
Frequency of flooding: Occasional for long periods from March through June
Water table: At the surface to 36 inches below the surface from April through July; below a depth of 40 inches from August through November
Kind of water table: Apparent
Ponding: 12 inches above the surface from April through July for very long periods
Hazard of water erosion in bare areas: None

Characteristics of the Jacksback Soil

Position on the landscape: Foot slopes
Parent material: Alluvium from andesitic rock
Typical profile:
0 to 21 inches—brown loam
21 to 42 inches—mottled, brown sandy clay loam
42 to 52 inches—mottled, light yellowish brown sandy loam
52 to 75 inches—mottled, very pale brown very fine sandy loam, coarse sandy loam, and sandy loam
75 to 80 inches—mottled, very pale brown silt loam
Depth class: Very deep
Drainage class: Poorly drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Moderate
Surface runoff: Very slow or ponded
Depth to hardpan: 40 to 60 inches
Depth to bedrock: More than 60 inches
Frequency of flooding: Rare for brief periods from March through May
Water table: At the surface to 36 inches below the

surface from March through May; below a depth of 40 inches from June through November
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

- Channeled areas
- Soils that are similar to the Gardens soil but are wetter and have silt loam textures
- Soils that are similar to the Gardens soil but have a silica-cemented substratum; in stream channels
- Very cobbly outwash in stream channels

Use and Management

Land use: Timber production on the Jacksback soil; livestock grazing or wetland wildlife habitat on both soils

Common plants on the Gardens soil

- Rush, carex, bentgrass, bluegrass, tufted hairgrass, other perennial forbs

Woodland vegetation on the Jacksback soil

Main tree species: Lodgepole pine, white fir, quaking aspen
Mean site index for stated species: Lodgepole pine—86
Dunning site class: XX
Common understory plants: Serviceberry, Douglas spirea, western huckleberry, skunkbush sumac, rose

Timber production

Major management factors: Gardens—high water table, compaction hazard; Jacksback—high water table, compaction hazard, plant competition
Management considerations:
- The high water table limits the survival of native trees and shrubs. Species that are adapted to wet sites, such as willows, cottonwoods, and aspens, should be selected.
- During periods when the water table is near the surface, the use of equipment is restricted. Culverts can help to overcome the effects of the seasonal high water table.
- The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
- Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
- Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
- Trees suitable for planting include lodgepole pine.

Livestock grazing

Major management factors: Flooding, high water table, ponding
Management considerations:
- Livestock operations can be impaired by the flooding and the high water table in winter and spring.
- The flooding and the high water table should be considered when stand renovation or reestablishment is planned.
- If seeding is desired, species that are adapted to wet conditions should be selected.
- The high water table saturates the soil in the winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
- Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Wetland wildlife habitat

Management considerations:
- This unit can provide important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
- Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
- Drainage of wetlands in areas of this unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: Gardens and Jacksback—Vw-2, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Range site: Gardens—Wet Meadow, MAP 20+ (22e)
Woodland ordination symbol: Jacksback—5W

170—Gasper-Scarface complex, 15 to 30 percent slopes

Setting

Landform: Lava plateaus and hills
Elevation: 3,200 to 5,100 feet
Slope range: 15 to 30 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 49 degrees F
Frost-free period: 80 to 100 days

Composition

Gasper and similar soils: 45 percent
Scarface and similar soils: 40 percent
Contrasting inclusions: 15 percent

Characteristics of the Gasper Soil

Position on the landscape: Side slopes
Parent material: Tephra
Typical profile:
0 to 4 inches—brown gravelly sandy loam
4 to 16 inches—reddish brown gravelly sandy loam
16 to 38 inches—light reddish brown very cobbly sandy loam and extremely stony sandy loam
38 to 60 inches—light reddish brown and light brown very cobbly sandy clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Scarface Soil

Position on the landscape: Side slopes
Parent material: Tephra
Typical profile:
2 inches to 0—duff
0 to 16 inches—dark yellowish brown and strong brown sandy loam
16 to 24 inches—strong brown sandy loam
24 to 37 inches—strong brown gravelly sandy clay loam
37 to 52 inches—yellowish brown gravelly sandy clay loam
52 to 84 inches—yellowish brown gravelly sandy clay loam and brownish yellow gravelly clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very high
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

- Boardburn soils, which are 40 to 60 inches deep to weathered bedrock and have less than 35 percent clay in the subsoil; on side slopes
- Hambone soils, which are 40 to 60 inches deep to weathered bedrock and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on back slopes and shoulders

Use and Management

Land use: Timber production

Woodland vegetation on the Gasper soil

Main tree species: Ponderosa pine, sugar pine, incense cedar, white fir
Mean site index for stated species: Ponderosa pine and Jeffrey pine—108
Dunning site class: 2
CACTOS site index: 79
Common understory plants: Squawcarpet, bottlebrush squirreltail, greenleaf manzanita, snowbrush ceanothus, needlegrass

Woodland vegetation on the Scarface soil

Main tree species: Ponderosa pine, incense cedar, sugar pine, white fir
Mean site index for stated species: Ponderosa pine and Jeffrey pine—97
Dunning site class: 2
CACTOS site index: 65
Common understory plants: Greenleaf manzanita, squawcarpet, gooseberry

Timber production

Major management factors: Gasper—water erosion, compaction hazard, plant competition, hazard of fire damage; Scarface—water erosion, compaction hazard, plant competition
Management considerations:
- Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- Roads and landings can be protected from erosion by constructing water bars.
- The use of heavy equipment when the soil is moist can result in surface compaction. Compaction

reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include ponderosa pine and white fir.

Interpretive Groups

Land capability classification: Gasper and Scarface—IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Gasper—8F; Scarface—7A

171—Gasper-Scarface complex, 30 to 50 percent slopes

Setting

Landform: Hills
Elevation: 3,200 to 5,100 feet
Slope range: 30 to 50 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 49 degrees F
Frost-free period: 80 to 100 days

Composition

Gasper and similar soils: 60 percent
Scarface and similar soils: 30 percent
Contrasting inclusions: 10 percent

Characteristics of the Gasper Soil

Position on the landscape: Side slopes
Parent material: Tephra
Typical profile:
0 to 4 inches—brown gravelly sandy loam
4 to 16 inches—reddish brown gravelly sandy loam
16 to 38 inches—light reddish brown very cobbly sandy loam and extremely stony sandy loam
38 to 60 inches—light reddish brown and light brown very cobbly sandy clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate or high

Characteristics of the Scarface Soil

Position on the landscape: Side slopes
Parent material: Tephra
Typical profile:
2 inches to 0—duff
0 to 16 inches—dark yellowish brown and strong brown sandy loam
16 to 24 inches—strong brown sandy loam
24 to 37 inches—strong brown gravelly sandy clay loam
37 to 52 inches—yellowish brown gravelly sandy clay loam
52 to 84 inches—yellowish brown gravelly sandy clay loam and brownish yellow gravelly clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very high
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: High

Contrasting Inclusions

• Boardburn soils, which are 40 to 60 inches deep to weathered bedrock and have less than 35 percent clay in the subsoil; on back slopes
• Hambone soils, which are 40 to 60 inches deep to weathered bedrock and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on shoulders

Use and Management

Land use: Timber production

Woodland vegetation on the Gasper soil

Main tree species: Ponderosa pine, sugar pine, incense cedar, white fir
Mean site index for stated species: Ponderosa pine and Jeffrey pine—108
Dunning site class: 2

CACTOS site index: 79
Common understory plants: Greenleaf manzanita, needlegrass, squawcarpet, deerbrush, serviceberry

Woodland vegetation on the Scarface soil

Main tree species: Ponderosa pine, sugar pine, incense cedar, white fir
Mean site index for stated species: Ponderosa pine—97
Dunning site class: 2
CACTOS site index: 65
Common understory plants: Greenleaf manzanita, gooseberry, squawcarpet, deerbrush

Timber production

Major management factors: Slope, water erosion, compaction hazard, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• The slope limits the kinds of equipment that can be used in forest management.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include ponderosa pine and white fir.

Interpretive Groups

Land capability classification: Gasper and Scarface—VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Gasper—8R; Scarface—7R

172—Gasper-Scarface complex, moist, 2 to 15 percent slopes

Setting

Landform: Lava plateaus and hills
Elevation: 3,000 to 4,700 feet
Slope range: 2 to 15 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 49 degrees F
Frost-free period: 80 to 100 days

Composition

Gasper and similar soils: 50 percent
Scarface and similar soils: 35 percent
Contrasting inclusions: 15 percent

Characteristics of the Gasper Soil

Position on the landscape: Toe slopes
Parent material: Tephra
Typical profile:
1 inch to 0—duff
0 to 5 inches—dark yellowish brown gravelly sandy loam
5 to 44 inches—yellowish brown very cobbly sandy loam and light brown very cobbly sandy loam
44 to 61 inches—light yellowish brown very cobbly sandy clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Scarface Soil

Position on the landscape: Foot slopes
Parent material: Tephra
Typical profile:
1 inch to 0—duff

0 to 30 inches—brown sandy loam
30 to 61 inches—light brown gravelly sandy clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very high
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Chatterdown soils, which have medial material over less than 35 percent clay in the substratum and do not have an argillic horizon; on toe slopes
• Nikal soils, which are 20 to 40 inches deep to hard bedrock and have medial over loamy-skeletal material; on foot slopes
• Soils that are similar to the Gasper soil but are less than 40 inches deep; on back slopes and shoulders

Use and Management

Land use: Timber production

Woodland vegetation on the Gasper soil

Main tree species: White fir, sugar pine, California black oak, Douglas-fir, incense cedar, ponderosa pine
Mean site index for stated species: White fir—63
Dunning site class: 2
CACTOS site index: 68
Common understory plants: Deerbrush, rose, serviceberry, Pacific dogwood, snowberry

Woodland vegetation on the Scarface soil

Main tree species: White fir, sugar pine, California black oak, Douglas-fir, incense cedar, ponderosa pine
Mean site index for stated species: White fir—62; Douglas-fir—103
Dunning site class: 2
CACTOS site index: 68
Common understory plants: Deerbrush, gooseberry, Idaho fescue

Timber production

Major management factors: Gasper—compaction hazard, plant competition; Scarface—water erosion, compaction hazard, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as stumps and limbs, on about 30 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir and Douglas-fir.

Interpretive Groups

Land capability classification: Gasper and Scarface—IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Gasper—10F; Scarface—9A

173—Gasper-Scarface complex, moist, 15 to 30 percent slopes

Setting

Landform: Lava plateaus and hills
Elevation: 3,000 to 4,700 feet
Slope range: 15 to 30 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 49 degrees F
Frost-free period: 80 to 100 days

Composition

Gasper and similar soils: 50 percent
Scarface and similar soils: 35 percent
Contrasting inclusions: 15 percent

Characteristics of the Gasper Soil

Position on the landscape: Side slopes
Parent material: Tephra
Typical profile:
1 inch to 0—duff
0 to 5 inches—dark yellowish brown gravelly sandy loam
5 to 44 inches—brown and light brown very cobbly sandy loam
44 to 61 inches—light yellowish brown very cobbly sandy clay loam
Depth class: Very deep

Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Scarface Soil

Position on the landscape: Side slopes
Parent material: Tephra
Typical profile:
1 inch to 0—duff
0 to 30 inches—brown sandy loam
30 to 61 inches—light brown gravelly sandy clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very high
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

• Chatterdown soils, which have medial material over less than 35 percent clay in the substratum and do not have an argillic horizon; on side slopes
• Nikal soils, which are 20 to 40 inches deep to hard bedrock and have medial over loamy-skeletal material; on shoulders and back slopes
• Soils that are similar to the Gasper soil but are less than 40 inches deep; on shoulders and back slopes
• Soils that are similar to the Scarface and Gasper soils but have flaggy andesite bedrock at a depth of 10 to 20 inches; on shoulders

Use and Management

Land use: Timber production

Woodland vegetation on the Gasper soil

Main tree species: Incense cedar, ponderosa pine, Douglas-fir, California black oak, sugar pine, white fir
Mean site index for stated species: White fir—63
Dunning site class: 2
CACTOS site index: 68
Common understory plants: Deerbrush, rose, serviceberry, Pacific dogwood, snowberry

Woodland vegetation on the Scarface soil

Main tree species: California black oak, ponderosa pine, Douglas-fir, incense cedar, sugar pine, white fir
Mean site index for stated species: Douglas-fir—103; white fir—62
Dunning site class: 2
CACTOS site index: 68
Common understory plants: Deerbrush, Idaho fescue, gooseberry

Timber production

Major management factors: Water erosion, compaction hazard, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir and Douglas-fir.

Interpretive Groups

Land capability classification: Gasper and Scarface—IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Gasper—10F; Scarface—9A

174—Gasper-Scarface complex, moist, 30 to 50 percent slopes

Setting

Landform: Hills
Elevation: 3,000 to 4,700 feet
Slope range: 30 to 50 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 40 to 50 inches

Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 49 degrees F
Frost-free period: 80 to 100 days

Composition

Gasper and similar soils: 60 percent
Scarface and similar soils: 20 percent
Contrasting inclusions: 20 percent

Characteristics of the Gasper Soil

Position on the landscape: Shoulders and back slopes
Parent material: Tephra
Typical profile:
1 inch to 0—duff
0 to 5 inches—dark yellowish brown gravelly sandy loam
5 to 44 inches—brown and light brown very cobbly sandy loam
44 to 61 inches—light yellowish brown very cobbly sandy clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate or high

Characteristics of the Scarface Soil

Position on the landscape: Side slopes
Parent material: Tephra
Typical profile:
1 inch to 0—duff
0 to 30 inches—brown sandy loam
30 to 61 inches—light brown gravelly sandy clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very high
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: High

Contrasting Inclusions

• Chatterdown soils, which have medial material over less than 35 percent clay in the substratum and do not have an argillic horizon; on foot slopes
• Nikal soils, which are 20 to 40 inches deep to hard bedrock and have medial over loamy-skeletal material; on shoulders and back slopes
• Rock outcrop; on shoulders
• Areas that have slopes of 2 to 15 percent or 15 to 30 percent
• Soils that are similar to the Gasper and Scarface soils but have flaggy andesite bedrock at a depth of 10 to 20 inches; on shoulders
• Soils that are similar to the Gasper soil but have more than 50 percent rock fragments; on back slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Gasper soil

Main tree species: White fir, sugar pine, incense cedar, Douglas-fir, ponderosa pine, California black oak
Mean site index for stated species: White fir—63
Dunning site class: 2
CACTOS site index: 68
Common understory plants: Deerbrush, Pacific dogwood, serviceberry, rose, snowberry

Woodland vegetation on the Scarface soil

Main tree species: White fir, Douglas-fir, incense cedar, sugar pine, ponderosa pine, California black oak
Mean site index for stated species: White fir—62; Douglas-fir—103
Dunning site class: 2
CACTOS site index: 68
Common understory plants: Deerbrush, Idaho fescue, gooseberry

Timber production

Major management factors: Water erosion, slope, compaction hazard, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• The slope limits the kinds of equipment that can be used in forest management.
• Plant competition delays natural regeneration but

does not prevent the eventual development of a fully stocked, normal stand of trees.

- Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
- Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
- The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
- Trees suitable for planting include white fir and Douglas-fir.

Interpretive Groups

Land capability classification: Gasper and Scarface—VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Gasper—10R; Scarface—9R

175—Gooval cobbly loam, 2 to 9 percent slopes

Setting

Landform: Lava plateaus
Elevation: 3,100 to 3,600 feet
Slope range: 2 to 9 percent
Vegetation: Grasses, scattered Oregon white oak, conifers, and shrubs
Mean annual precipitation: 16 to 25 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Gooval and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Gooval Soil

Parent material: Tephra over basalt
Typical profile:
0 to 8 inches—brown cobbly loam
8 to 14 inches—reddish brown very cobbly clay loam
14 to 23 inches—reddish brown very cobbly clay
23 inches—weathered basalt
Depth class: Moderately deep
Drainage class: Moderately well drained
Slowest permeability class: Slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Slow or medium
Depth to bedrock: 20 to 40 inches
Water table: At the surface to 24 inches below the surface from February through April
Kind of water table: Perched
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

- Arkright soils, which have less than 35 percent clay in the subsoil; on foot slopes
- Areas that have slopes of 9 to 25 percent
- Soils that are less than 20 inches deep to bedrock; on shoulders
- Soils that have less than 35 percent rock fragments in the profile; on foot slopes

Use and Management

Land use: Wood products or grazing

Woodland vegetation

Main woodland species: Ponderosa pine, Oregon white oak, western juniper
Mean site index for stated species: Ponderosa pine—65
Common understory plants: Buckbrush, skunkbush sumac, greenleaf manzanita, birchleaf mountainmahogany

Wood products

Major management factors: Water erosion, seasonal high water table
Management considerations:

- Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- The seasonal high water table limits the survival of native trees and shrubs. Plant roots cannot survive extended periods of high water. Species that are adapted to wet sites, such as willows, cottonwoods, and aspens, should be planted.

Woodland grazing

Major management factors: Water erosion, seasonal high water table, limited available water capacity
Management considerations:

- Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 20 percent

of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The high water table saturates the soil in the winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
• The high water table limits the choice of plant species that can be used for seeding.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: IVw-7, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland

176—Gosch very stony sandy loam, 15 to 30 percent slopes

Setting

Landform: Mountains
Elevation: 4,600 to 6,500 feet
Slope range: 15 to 30 percent
Vegetation: Jeffrey pine, white fir, and shrubs
Mean annual precipitation: 18 to 20 inches
Mean annual air temperature: 40 to 45 degrees F
Mean annual soil temperature: 41 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Gosch and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Gosch Soil

Important surface feature: About 20 to 30 percent of the surface is covered with stones and cobbles.
Parent material: Tephra
Typical profile:
4 inches to 0—duff
0 to 4 inches—brown very stony sandy loam
4 to 8 inches—dark yellowish brown very stony sandy loam
8 to 20 inches—brown very cobbly sandy clay loam
20 to 42 inches—brown extremely cobbly sandy clay loam
42 inches—weathered andesite
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Low
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Rock outcrop; on shoulders
• Soils that are less than 20 inches deep; on shoulders and summits
• Soils that are less than 40 inches deep to bedrock; on back slopes
• Witcher soils, which have medial over loamy material; on side slopes

Use and Management

Land use: Timber production or homesite development

Woodland vegetation

Main tree species: White fir, incense cedar
Mean site index for stated species: White fir—50; ponderosa pine—76
Dunning site class: 3
CACTOS site index: 55
Common understory plants: Greenleaf manzanita, squawcarpet, curlleaf mountainmahogany, muleears, mountain big sagebrush

Timber production

Major management factors: Water erosion, rock fragments on the surface, compaction hazard, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• The routing of equipment should be planned before operations are begun.
• The rock fragments on the surface can interfere with felling, yarding, and other activities involving the use of equipment and can limit the choice of mechanized planting equipment.
• The rock fragments in the profile hinder planting efforts in areas where the subsoil is exposed or disturbed. The appropriate tools and techniques should be used.

• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir, Jeffrey pine, and ponderosa pine.

Homesite development

Major management factors: Water erosion, slope, large stones, restricted permeability
Management considerations:
• Maintaining a permanent cover of vegetation on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• During construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.
• Because of the large stones, digging the trenches for the foundation may be difficult. If too many large stones are on the surface, hand digging may be necessary. Any stones larger than the trench width can be left in place.
• If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.
• Large stones can hinder the installation of the leach field and reduce the filtering capacity. Increasing the size of the leach field helps to overcome this limitation.
• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: VIs, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 4X

177—Gosch-Witcher complex, 30 to 50 percent slopes

Setting

Landform: Mountains
Elevation: 4,600 to 6,500 feet
Slope range: 30 to 50 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 18 to 20 inches
Mean annual air temperature: 40 to 45 degrees F
Mean annual soil temperature: 41 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Gosch and similar soils: 50 percent
Witcher and similar soils: 35 percent
Contrasting inclusions: 15 percent

Characteristics of the Gosch Soil

Position on the landscape: Back slopes and shoulders
Parent material: Tephra
Typical profile:
1 inch to 0—duff
0 to 3 inches—brown gravelly sandy loam
3 to 9 inches—brown extremely stony sandy loam
9 to 32 inches—brown extremely stony sandy clay loam and extremely stony clay loam
32 to 50 inches—brown extremely gravelly clay loam
50 inches—weathered andesite
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Moderate or high

Characteristics of the Witcher Soil

Position on the landscape: Back slopes
Parent material: Tephra
Typical profile:
2 inches to 0—duff
0 to 4 inches—brown sandy loam
4 to 36 inches—brown sandy clay loam
36 to 47 inches—brown very gravelly clay loam
47 inches—weathered andesite

Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: High

Contrasting Inclusions

• Rock outcrop; on side slopes
• Soils that are less than 20 inches deep; on shoulders
• Soils that are similar to the Gosch soil but are less than 40 inches deep to bedrock; on back slopes
• Soils that are similar to the Witcher soil but are less than 40 inches deep to bedrock; on back slopes

Use and Management

Land use: Timber production or homesite development

Woodland vegetation on the Gosch soil

Main tree species: White fir, Jeffrey pine, ponderosa pine, incense cedar
Mean site index for stated species: White fir—50; Jeffrey pine and ponderosa pine—76
Dunning site class: 3
CACTOS site index: 55
Common understory plants: Greenleaf manzanita, squawcarpet, bitter cherry, Sierra chinkapin, snowbrush ceanothus

Woodland vegetation on the Witcher soil

Main tree species: White fir, incense cedar
Mean site index for stated species: White fir—43; Jeffrey pine and ponderosa pine—79
Dunning site class: 3
CACTOS site index: 54
Common understory plants: Greenleaf manzanita, squawcarpet, snowbrush ceanothus, Sierra chinkapin, serviceberry, bitter cherry

Timber production

Major management factors: Gosch—slope, water erosion, compaction hazard, limited available water capacity, plant competition, hazard of fire damage; Witcher—slope, water erosion, compaction hazard, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• The slope limits the kinds of equipment that can be used in forest management.
• The rock fragments in the profile hinder planting efforts in areas where the subsoil is exposed or disturbed. The appropriate tools and techniques should be used.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir and ponderosa pine.

Homesite development

Major management factors: Water erosion, slope, restricted permeability
Management considerations:
• Maintaining a permanent cover of vegetation on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• During construction, all bare ground should be

mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.

• If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.

• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.

• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Gosch and Witcher—VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Gosch—6R; Witcher—5R

178—Goulder gravelly sandy loam, 2 to 15 percent slopes

Setting

Landform: Lava plateaus and mountains
Elevation: 4,400 to 6,000 feet
Slope range: 2 to 15 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 39 to 44 degrees F
Mean annual soil temperature: 41 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Goulder and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Goulder Soil

Parent material: Tephra over andesitic lava
Typical profile:
1 inch to 0—duff
0 to 7 inches—brown gravelly sandy loam
7 to 17 inches—brown cobbly sandy loam
17 to 27 inches—brown cobbly loam
27 to 41 inches—brown cobbly clay loam
41 to 58 inches—brown very gravelly clay loam
58 to 64 inches—brown very bouldery clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Danhunt soils, which do not have an argillic horizon and are medial-skeletal throughout; on back slopes
• Mounthat soils, which are 20 to 40 inches deep to weathered bedrock; on escarpments and side slopes
• Obie soils, which are 40 to 60 inches deep to weathered bedrock and have a dark surface horizon more than 20 inches thick; on foot slopes
• Soils that are less than 40 inches deep to bedrock; on the steeper side slopes
• Soils that have less than 35 percent rock fragments; on back slopes
• Stacher soils, which do not have an argillic horizon; on back slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, California red fir, California black oak, incense cedar, sugar pine, ponderosa pine, Douglas-fir
Mean site index for stated species: White fir—76
Dunning site class: 1
CACTOS site index: 85
Common understory plants: Greenleaf manzanita, Sierra chinkapin, princes pine, gooseberry, snowbrush ceanothus, brackenfern, snowberry, whitethorn ceanothus

Timber production

Major management factors: Water erosion, compaction hazard, plant competition
Management considerations:

• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.

• Roads and landings can be protected from erosion by constructing water bars.

• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.

• Plant competition delays natural regeneration but

does not prevent the eventual development of a fully stocked, normal stand of trees.
- Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
- Trees suitable for planting include white fir, California red fir, ponderosa pine, and Douglas-fir.

Interpretive Groups

Land capability classification: IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 13F

179—Goulder gravelly sandy loam, 15 to 30 percent slopes

Setting

Landform: Lava plateaus and mountains
Elevation: 4,400 to 6,000 feet
Slope range: 15 to 30 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 39 to 44 degrees F
Mean annual soil temperature: 41 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Goulder and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Goulder Soil

Parent material: Tephra over andesitic lava
Typical profile:
1 inch to 0—duff
0 to 7 inches—brown gravelly sandy loam
7 to 17 inches—brown cobbly sandy loam
17 to 27 inches—brown cobbly loam
27 to 41 inches—brown cobbly clay loam
41 to 58 inches—brown very gravelly clay loam
58 to 64 inches—brown very bouldery clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

- Mounthat soils, which are 20 to 40 inches deep to weathered bedrock; on escarpments and the steeper side slopes
- Obie soils, which are 40 to 60 inches deep to weathered bedrock and have medial-skeletal material throughout
- Soils that are less than 40 inches deep; on the steeper side slopes
- Stacher soils, which do not have an argillic horizon; on back slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, California red fir, sugar pine, incense cedar, Douglas-fir, ponderosa pine, California black oak
Mean site index for stated species: White fir—76
Dunning site class: 1
CACTOS site index: 85
Common understory plants: Greenleaf manzanita, snowbrush ceanothus, brackenfern, snowberry, Sierra chinkapin, princes pine, gooseberry, whitethorn ceanothus

Timber production

Major management factors: Water erosion, compaction hazard, plant competition
Management considerations:
- Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- Roads and landings can be protected from erosion by constructing water bars.
- Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
- The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
- Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
- Maintenance of evenly distributed organic material,

such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir, California red fir, ponderosa pine, and Douglas-fir.

Interpretive Groups

Land capability classification: IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 13F

180—Goulder gravelly sandy loam, 30 to 50 percent slopes

Setting

Landform: Lava plateaus and mountains
Elevation: 4,400 to 6,000 feet
Slope range: 30 to 50 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 39 to 44 degrees F
Mean annual soil temperature: 41 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Goulder and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Goulder Soil

Parent material: Tephra over andesitic lava
Typical profile:
1 inch to 0—duff
0 to 7 inches—brown gravelly sandy loam
7 to 17 inches—brown cobbly sandy loam
17 to 27 inches—brown cobbly loam
27 to 41 inches—brown cobbly clay loam
41 to 58 inches—brown very gravelly clay loam
58 to 64 inches—brown very bouldery clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate or high

Contrasting Inclusions

• Danhunt soils, which do not have an argillic horizon and are medial-skeletal throughout; on side slopes
• Mounthat soils, which are 20 to 40 inches deep to weathered bedrock; on side slopes
• Soils that are less than 40 inches deep; on side slopes
• Stacher soils, which do not have an argillic horizon; on back slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, ponderosa pine, California red fir, incense cedar, sugar pine, California black oak, Douglas-fir
Mean site index for stated species: White fir—76
Dunning site class: 1
CACTOS site index: 85
Common understory plants: Greenleaf manzanita, Sierra chinkapin, princes pine, gooseberry, snowbrush ceanothus, brackenfern, snowberry, whitethorn ceanothus

Timber production

Major management factors: Slope, water erosion, compaction hazard, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• The slope limits the kinds of equipment that can be used in forest management.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material,

such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir, California red fir, ponderosa pine, and Douglas-fir.

Interpretive Groups

Land capability classification: VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 13R

181—Gullied land-Rock outcrop-Mounthat complex, 50 to 75 percent slopes

Setting

Landform: Mountains
Elevation: 4,500 to 5,700 feet
Slope range: 50 to 75 percent
Vegetation: Shrubs, grasses, and scattered conifers
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 39 to 44 degrees F
Mean annual soil temperature: 41 to 46 degrees F
Frost-free period: 80 to 100 days

Composition

Gullied land: 50 percent
Rock outcrop: 30 percent
Mounthat and similar soils: 10 percent
Contrasting inclusions: 10 percent

Characteristics of the Gullied Land

• Gullied land consists of areas that have very steep slopes of soft sandstone conglomerate. The soft sandstone matrix is severely eroded, and rounded gravel and cobbles are exposed in very steep scarps and valleys. The areas are generally barren, but a few trees and shrubs grow in some of the less sloping areas.

Characteristics of the Rock Outcrop

• Rock outcrop consists of nearly vertical exposures of hard fractured bedrock that abruptly terminate at the adjacent landscape. The vertical sides may drop by as much as 1,000 feet. The areas generally are barren, but in some areas a few trees, shrubs, or grasses grow between the rocks.

Characteristics of the Mounthat Soil

Position on the landscape: Toe slopes
Parent material: Debris flow over residuum from nonvesicular material over vesicular andesitic basalt
Typical profile:
1 inch to 0—duff
0 to 10 inches—dark brown and brown gravelly sandy loam
10 to 27 inches—brown very cobbly sandy loam
27 inches—weathered andesite
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Very rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: High

Contrasting Inclusions

• Etsel soils, which are less than 20 inches deep to hard bedrock; on back slopes and shoulders
• Rubble land; on escarpments

Use and Management

Land use: Timber production

Woodland vegetation on the Mounthat soil

Main tree species: White fir, California black oak, incense cedar, sugar pine, ponderosa pine
Mean site index for stated species: White fir—69
Dunning site class: 1
CACTOS site index: 84
Common understory plants: Gooseberry, serviceberry, brackenfern, princes pine
Major management factors: Gullied land—water erosion, very rapid runoff, slope, depth to rock; Rock outcrop—slope, rock fragments; Mounthat—water erosion, very rapid runoff, slope, depth to rock, plant competition, hazard of fire damage

Timber production

Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Maintaining the understory vegetation is essential in controlling erosion.
• Proper design of road drainage systems and care

in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• Erosion can be severe during intense thunderstorms in the summer or during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• The very rapid runoff rate can result in severe erosion if water is allowed to concentrate in bare areas, such as skid trails or roads.
• Using conventional harvesting methods is difficult because of the slope.
• The slope limits the use of wheeled and tracked equipment in skidding operations. End lining generally causes less disturbance of the soil.
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
• The routing of equipment should be planned before operations are begun.
• The rock fragments on the surface can interfere with felling, yarding, and other activities involving the use of equipment and can limit the choice of mechanized planting equipment.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Rock outcrop tends to interfere with felling and yarding and with other uses of equipment. Vehicular traffic should be limited in areas of Rock outcrop during harvesting activities.
• Trees suitable for planting include white fir, sugar pine, and ponderosa pine.

Interpretive Groups

Land capability classification: Gullied land—VIII, nonirrigated; Rock outcrop—VIII, nonirrigated; Mounthat—VIIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Mounthat—11R

182—Hambone-Boardburn complex, 15 to 30 percent slopes

Setting

Landform: Hills
Elevation: 4,200 to 4,800 feet
Slope range: 15 to 30 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 20 to 30 inches
Mean annual air temperature: 45 to 47 degrees F
Mean annual soil temperature: 48 to 49 degrees F
Frost-free period: 80 to 100 days

Composition

Hambone and similar soils: 60 percent
Boardburn and similar soils: 30 percent
Contrasting inclusions: 10 percent

Characteristics of the Hambone Soil

Position on the landscape: Side slopes
Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
2 inches to 0—duff
0 to 8 inches—dark brown and brown gravelly sandy loam
8 to 22 inches—brown very gravelly sandy clay loam
22 to 45 inches—brown extremely cobbly sandy clay loam
45 inches—weathered tuff
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Low
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Boardburn Soil

Position on the landscape: Foot slopes
Parent material: Colluvium from extrusive igneous rock
Typical profile:
0 to 9 inches—yellowish brown and brown sandy loam
9 to 22 inches—light brown loam
22 to 40 inches—light brown sandy clay loam
40 to 50 inches—reddish yellow very gravelly sandy clay loam

50 inches—weathered andesitic tuff
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

- Chirpchatter soils, which are more than 60 inches deep and have less than 35 percent clay in the subsoil; on the lower toe slopes
- Rock outcrop
- Soils that are similar to the Hambone soil but are 20 to 40 inches deep to hard bedrock; on shoulders
- Soils that are similar to the Hambone soil but have a surface layer of extremely cobbly sandy loam; on escarpments and shoulders

Use and Management

Land use: Timber production

Woodland vegetation on the Hambone soil

Main tree species: Douglas-fir, incense cedar, ponderosa pine, sugar pine, white fir
Mean site index for stated species: Douglas-fir—89; ponderosa pine—75; white fir—51
Dunning site class: 3
CACTOS site index: 56
Common understory plants: Greenleaf manzanita, buckbrush, squawcarpet, mountainmahogany, Idaho fescue, lupine, bluegrass, western chokecherry, skunkbush sumac

Woodland vegetation on the Boardburn soil

Main tree species: Ponderosa pine, sugar pine, California black oak, white fir, incense cedar
Mean site index for stated species: Ponderosa pine—71
Dunning site class: 4
CACTOS site index: 45
Common understory plants: Greenleaf manzanita, squawcarpet, antelope bitterbrush, princes pine

Timber production

Major management factors: Hambone—water erosion, rock fragments, compaction hazard, limited available water capacity, plant competition, hazard of fire damage; Boardburn—water erosion, compaction hazard, plant competition

Management considerations:
- Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 50 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- Roads and landings can be protected from erosion by constructing water bars.
- The rock fragments in the profile hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
- The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
- The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
- Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
- Maintenance of evenly distributed organic material, such as limbs and needles, improves productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
- Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
- Trees suitable for planting include white fir, sugar pine, ponderosa pine, and Douglas-fir.

Interpretive Groups

Land capability classification: Hambone—IVe-4, nonirrigated; Boardburn—IVe-3, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Hambone—4F; Boardburn—4A

183—Hambone-Boardburn complex, 30 to 50 percent slopes

Setting

Landform: Hills
Elevation: 4,200 to 4,800 feet
Slope range: 30 to 50 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 20 to 30 inches

Mean annual air temperature: 45 to 47 degrees F
Mean annual soil temperature: 48 to 49 degrees F
Frost-free period: 80 to 100 days

Composition

Hambone and similar soils: 70 percent
Boardburn and similar soils: 20 percent
Contrasting inclusions: 10 percent

Characteristics of the Hambone Soil

Position on the landscape: Back slopes and shoulders
Important surface feature: About 10 to 20 percent of the surface is covered with cobbles and stones.
Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
2 inches to 0—duff
0 to 8 inches—dark brown and brown gravelly sandy loam
8 to 22 inches—brown very gravelly sandy clay loam
22 to 45 inches—strong brown extremely cobbly sandy clay loam
45 inches—weathered tuff
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Low
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Moderate or high

Characteristics of the Boardburn Soil

Position on the landscape: Side slopes
Parent material: Colluvium from extrusive igneous rock
Typical profile:
0 to 9 inches—yellowish brown and light brown sandy loam
9 to 22 inches—light brown loam
22 to 40 inches—light brown sandy clay loam
40 to 50 inches—reddish yellow very gravelly sandy clay loam
50 inches—weathered andesitic tuff
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: High

Contrasting Inclusions

- Chirpchatter soils, which are more than 60 inches deep and have less than 35 percent clay in the subsoil; on the lower toe slopes
- Rock outcrop
- Soils that are similar to the Hambone soil but are 20 to 40 inches deep to hard bedrock; on shoulders
- Soils that are similar to the Hambone soil but have a surface layer of extremely cobbly sandy loam; on shoulders and escarpments

Use and Management

Land use: Timber production

Woodland vegetation on the Hambone soil

Main tree species: Ponderosa pine, incense cedar, sugar pine, white fir, Douglas-fir
Mean site index for stated species: Ponderosa pine—75; white fir—51; Douglas-fir—89
Dunning site class: 3
CACTOS site index: 56
Common understory plants: Greenleaf manzanita, buckbrush, squawcarpet, mountainmahogany, Idaho fescue, lupine, bluegrass, western chokecherry, skunkbush sumac

Woodland vegetation on the Boardburn soil

Main tree species: Ponderosa pine, sugar pine, California black oak, white fir, incense cedar
Mean site index for stated species: Ponderosa pine—71
Dunning site class: 4
CACTOS site index: 45
Common understory plants: Greenleaf manzanita, Idaho fescue, squawcarpet, antelope bitterbrush, princes pine

Timber production

Major management factors: Hambone—water erosion, slope, rock fragments, compaction hazard, limited available water capacity, plant competition, hazard of fire damage; Boardburn—water erosion, slope, compaction hazard, plant competition, hazard of fire damage
Management considerations:
- Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- Roads and landings can be protected from erosion by constructing water bars.
- Proper design of road drainage systems and care in the placement of culverts help to control erosion.

Spoil from excavations is subject to rill and gully erosion and to sloughing.
• The slope limits the kinds of equipment that can be used in forest management.
• The rock fragments in the profile hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir, sugar pine, ponderosa pine, and Douglas-fir.

Interpretive Groups

Land capability classification: Hambone and Boardburn—VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Hambone and Boardburn—4R

184—Henhill silt loam, partially drained, 0 to 2 percent slopes

Setting

Landform: Stream terraces (fig. 6)
Elevation: 3,300 to 4,600 feet
Slope range: 0 to 2 percent
Vegetation: Grasses
Mean annual precipitation: 14 to 20 inches
Mean annual air temperature: 48 to 52 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 100 to 130 days

Composition

Henhill and similar soils: 90 percent
Contrasting inclusions: 10 percent

Characteristics of the Henhill Soil

Parent material: Lake sediments and alluvium from extrusive igneous rock
Typical profile:
0 to 21 inches—dark gray silt loam
21 to 46 inches—dark gray, brown, and pinkish gray silty clay loam
46 to 62 inches—light gray silt loam
Depth class: Very deep
Drainage class: Somewhat poorly drained
Slowest permeability class: Moderately slow
Available water capacity: Very high
Highest shrink-swell potential: Moderate
Surface runoff: Very slow
Depth to bedrock: More than 60 inches
Frequency of flooding: Occasional for long periods from November through April
Depth to the water table: 18 to 60 inches from November through April
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• The well drained Dotta soils, which are more than 60 inches deep; on foot slopes
• Soils that have a gravelly subsoil; near stream channels
• Lunsford soils, which are dark to a depth of less than 20 inches; in stream channels
• The very poorly drained Pastolla soils, which have more than 35 percent clay in the subsoil; in stream channels
• Soils that have a water table closer to the surface than the Henhill soil; near stream channels
• Soils that have clay in the subsoil; on toe slopes

Use and Management

Land use: Irrigated crops and pasture

Irrigated crops

Common crops: Alfalfa, grass-legume hay, barley, and wheat
Major management factors: Soil blowing, flooding, high water table, surface crusting
Management considerations:
• Soil blowing can be controlled by keeping the soil rough, using emergency tillage, stripcropping, and establishing windbreaks.

• The hazard of flooding should be considered before any cropping is done or capital improvements are installed.
• The high water table limits the choice of crops and cultivars and increases the risk of winterkill.
• Careful management of irrigation is needed to avoid raising the water table.
• Surface crusting can greatly reduce the water infiltration rate and hinder seedling emergence. Crusting can be minimized by returning crop residue to the soil and using frequent, light applications of irrigation water.

Pasture

Major management factors: Soil blowing, flooding, high water table, surface crusting
Management considerations:
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.
• Livestock operations can be impaired by flooding in winter and spring.
• The flooding and the high water table should be considered when stand renovation or reestablishment is planned. Species that are adapted to these conditions should be selected for seeding.
• The high water table saturates the soil in the winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
• Surface crusting can greatly reduce the water infiltration rate and hinder seedling emergence. Livestock can be used to break crusts. Maintaining a cover of vegetation minimizes surface crusting.

Interpretive Groups

Land capability classification: IIw-2, irrigated, and IIIw-2, nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland in irrigated areas that are drained

185—Henhill silt loam, gravelly substratum, 0 to 2 percent slopes

Setting

Landform: Stream terraces
Elevation: 4,100 to 4,600 feet
Slope range: 0 to 2 percent
Vegetation: Grasses
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 50 to 52 degrees F
Frost-free period: 100 to 120 days

Composition

Henhill and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Henhill Soil

Parent material: Lacustrine sediments and alluvium from extrusive igneous rock
Typical profile:
0 to 3 inches—gray silt loam
3 to 36 inches—gray silty clay loam
36 to 50 inches—grayish brown sandy clay loam
50 to 72 inches—grayish brown very gravelly sandy clay loam
Depth class: Very deep
Drainage class: Somewhat poorly drained
Slowest permeability class: Moderately slow
Available water capacity: Very high
Salinity: 0 to 2 mmhos/cm throughout
Highest shrink-swell potential: Moderate
Surface runoff: Very slow
Depth to bedrock: More than 60 inches
Frequency of flooding: Occasional for very long periods from November through April
Depth to the water table: 18 to 42 inches from November through April; 42 to 72 inches from May through October
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Chalkford soils, which are more than 60 inches deep and do not have an argillic horizon; on toe slopes
• Daphnedale soils, which are 20 to 40 inches deep to weathered bedrock and have more than 35 percent clay pebbles in the subsoil
• The well drained Dotta soils, which are more than 60 inches deep; on foot slopes
• Areas that have slopes of as much as 9 percent
• Soils that do not have a gravelly substratum; on foot slopes

Use and Management

Land use: Irrigated crops, pasture, or homesite development

Irrigated crops

Common crops: Alfalfa, grass-legume hay, barley, and wheat
Major management factors: Soil blowing, flooding, high water table, surface crusting
Management considerations:
• Soil blowing can be controlled by keeping the soil

rough, using emergency tillage, stripcropping, and establishing windbreaks.
• The hazard of flooding should be considered before any cropping is done or capital improvements are installed.
• The high water table limits the choice of crops and cultivars and increases the risk of winterkill.
• A high water table can damage deep-rooted crops.
• Careful management of irrigation is needed to avoid raising the water table.
• Surface crusting can greatly reduce the water infiltration rate and hinder seedling emergence. Crusting can be minimized by returning crop residue to the soil and using frequent, light applications of irrigation water.

Pasture

Major management factors: Soil blowing, flooding, high water table, surface crusting
Management considerations:
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.
• Livestock operations in the winter and spring can be impaired by flooding and a high water table. Equipment use and livestock trampling can damage the soil and vegetation.
• The selection of plant species should be carefully considered when stand renovation or vegetation reestablishment is planned. The flooding and the high water table can limit the choice of plant species and increase the likelihood that hydrophytic plants will invade.
• Surface crusting can greatly reduce the water infiltration rate and hinder seedling emergence. Livestock can be used to break crusts. Maintaining a cover of vegetation minimizes surface crusting.
• If seeding is desired, species that are adapted to wet conditions should be selected.
• Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Homesite development

Major management factors: Flooding, wetness, restricted permeability
Management considerations:
• Flooding can occur during the winter and early spring. The foundation should be taller than normal, or the buildings should be constructed at the highest elevations. Water should be intercepted by drainage ditches, or a drainage system should be developed around the foundation.
• Flooding can add water to the septic system. Diversion of floodwater helps to overcome this limitation.
• The high water table limits the absorption capacity of the leach field. A mounded septic system or other specialized leach field can help to overcome this limitation.
• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: IIw-4, irrigated, and IIIw-2, nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland in drained areas that are protected from flooding

186—Hermit-Canyoncreek complex, 2 to 15 percent slopes

Setting

Landform: Mountains
Elevation: 6,000 to 7,100 feet
Slope range: 2 to 15 percent
Vegetation: White fir, ponderosa pine, and shrubs
Mean annual precipitation: 20 to 25 inches
Mean annual air temperature: 38 to 43 degrees F
Mean annual soil temperature: 38 to 44 degrees F
Frost-free period: 40 to 50 days

Composition

Hermit and similar soils: 50 percent
Canyoncreek and similar soils: 35 percent
Contrasting inclusions: 15 percent

Characteristics of the Hermit Soil

Position on the landscape: Foot slopes
Parent material: Tephra
Typical profile:
2 inches to 0—duff
0 to 26 inches—brown sandy loam
26 to 42 inches—brown very gravelly loam
42 inches—weathered andesite
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Slow or medium

Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Canyoncreek Soil

Position on the landscape: Foot slopes
Parent material: Tephra
Typical profile:
3 inches to 0—duff
0 to 19 inches—dark grayish brown and brown sandy loam
19 to 43 inches—brown very stony loam
43 to 58 inches—yellowish brown extremely gravelly loam
58 inches—weathered andesite
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Gosch soils, which have more than 35 percent rock fragments and less than 35 percent clay in the subsoil and have an argillic horizon; on side slopes
• Soils that are 20 to 40 inches deep over cinders; on side slopes
• Soils that are less than 20 inches deep; on shoulders
• Soils that are similar to the Canyoncreek soil but have a buried argillic horizon; on toe slopes
• Soils that are similar to the Hermit soil but are less than 40 inches deep to bedrock; on foot slopes
• Soils that are similar to the Hermit soil but are more than 60 inches deep to bedrock; on toe slopes
• Soils that are similar to the Hermit soil but have a buried argillic horizon; on toe slopes
• Witcher soils, which have less than 35 percent clay in the subsoil and have an argillic horizon; on side slopes

Use and Management

Land use: Timber production or homesite development

Woodland vegetation on the Hermit soil

Main tree species: White fir, Jeffrey pine, ponderosa pine
Mean site index for stated species: White fir—50
Dunning site class: 3
CACTOS site index: 54
Common understory plants: Serviceberry, Sierra chinkapin, snowbrush ceanothus, bitter cherry, sticky currant

Woodland vegetation on the Canyoncreek soil

Main tree species: White fir, Jeffrey pine, ponderosa pine
Mean site index for stated species: White fir—49
Dunning site class: 4
CACTOS site index: 48
Common understory plants: Serviceberry, Sierra chinkapin, snowbrush ceanothus, bitter cherry, sticky currant

Timber production

Major management factors: Water erosion, compaction hazard, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir.

Homesite development

Major management factors: Hermit—water erosion, slope, depth to rock, restricted permeability; Canyoncreek—water erosion, slope, depth to rock, large stones, restricted permeability
Management considerations:
• Maintaining a permanent cover of vegetation on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• During construction, all bare ground should be

mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.
- Because of the large stones, digging the trenches for the foundation may be difficult. If too many large stones are on the surface, hand digging may be necessary. Any stones larger than the trench width can be left in place.
- If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.
- The limited depth to rock inhibits the filtering capacity of the leach fields or can prevent their placement. If the leach lines are placed too close to the bedrock, ground water may be contaminated by the effluent.
- The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
- If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Hermit and Canyoncreek—VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Hermit—6A; Canyoncreek—6F

187—Hunsinger-Chirpchatter complex, 2 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 3,800 to 4,500 feet
Slope range: 2 to 15 percent
Vegetation: Ponderosa pine, oak, shrubs, and grasses
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 49 degrees F
Frost-free period: 80 to 100 days

Composition

Hunsinger and similar soils: 55 percent
Chirpchatter and similar soils: 25 percent
Contrasting inclusions: 20 percent

Characteristics of the Hunsinger Soil

Position on the landscape: Toe slopes
Parent material: Colluvium from extrusive igneous rock
Typical profile:
0 to 13 inches—brown gravelly sandy loam
13 to 26 inches—strong brown very cobbly sandy clay loam
26 to 42 inches—strong brown cobbly sandy clay loam
42 inches—strongly weathered basalt
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Low
Highest shrink-swell potential: Moderate
Surface runoff: Medium
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Chirpchatter Soil

Position on the landscape: Foot slopes
Parent material: Older ashfalls
Typical profile:
1 inch to 0—duff
0 to 7 inches—yellowish brown sandy loam
7 to 32 inches—brown sandy clay loam
32 to 70 inches—brown and light yellowish brown gravelly sandy loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Moderate
Highest shrink-swell potential: Moderate
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

- Orhood soils, which are less than 20 inches deep; on escarpments
- Ricketts soils, which are 20 to 40 inches deep to hard bedrock; on foot slopes
- Soils that are similar to the Hunsinger soil but are more than 60 inches deep to bedrock; on toe slopes
- Splawn soils, which are 20 to 40 inches deep to hard bedrock and have more than 35 percent clay and rock fragments in the subsoil; on toe slopes

Use and Management

Land use: Timber production or homesite development

Woodland vegetation on the Hunsinger soil

Main tree species: Jeffrey pine, ponderosa pine, incense cedar, California black oak
Mean site index for stated species: Jeffrey pine and ponderosa pine—75
Dunning site class: 5
CACTOS site index: 54
Common understory plants: Squawcarpet, bluegrass, needlegrass, greenleaf manzanita, Idaho fescue, antelope bitterbrush

Woodland vegetation on the Chirpchatter soil

Main tree species: Jeffrey pine, ponderosa pine, incense cedar, California black oak, Oregon white oak
Mean site index for stated species: Jeffrey pine and ponderosa pine—75
Dunning site class: 4
CACTOS site index: 49
Common understory plants: Mountain big sagebrush, squawcarpet, greenleaf manzanita, buckbrush, antelope bitterbrush

Timber production

Major management factors: Hunsinger—compaction hazard, limited available water capacity, plant competition; Chirpchatter—water erosion, compaction hazard, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The limited available water capacity in the upper 24 inches of the soil reduces the rate of seedling survival and hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include Jeffrey pine and ponderosa pine.

Homesite development

Major management factors: Hunsinger—slope, large stones, shrink-swell, restricted permeability; Chirpchatter—slope, shrink-swell, restricted permeability
Management considerations:
• Maintaining a permanent cover of vegetation on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• During construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.
• Because of the large stones, digging the trenches for the foundation may be difficult. If too many large stones are on the surface, hand digging may be necessary. Any stones larger than the trench width can be left in place.
• The effects of shrinking and swelling can be minimized by using proper engineering designs or backfilling with material that has a low shrink-swell potential.
• If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.
• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Hunsinger—IVe-7, nonirrigated; Chirpchatter—IIIe-1, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Hunsinger—4F; Chirpchatter—4S

188—Hunsinger-Chirpchatter complex, 15 to 30 percent slopes

Setting

Landform: Hills
Elevation: 4,000 to 4,400 feet

Slope range: 15 to 30 percent
Vegetation: Ponderosa pine, oak, shrubs, and grasses
Mean annual precipitation: 20 to 25 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 49 degrees F
Frost-free period: 80 to 100 days

Composition

Hunsinger and similar soils: 55 percent
Chirpchatter and similar soils: 25 percent
Contrasting inclusions: 20 percent

Characteristics of the Hunsinger Soil

Position on the landscape: Side slopes
Parent material: Colluvium from extrusive igneous rock
Typical profile:
0 to 10 inches—brown gravelly sandy loam
10 to 55 inches—brown very cobbly sandy clay loam
55 inches—strongly weathered basalt
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Low
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Chirpchatter Soil

Position on the landscape: Side slopes
Parent material: Older ashfalls
Typical profile:
2 inches to 0—duff
0 to 15 inches—brown and dark yellowish brown sandy loam
15 to 70 inches—brown sandy clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

• Rivalier soils, which are 20 to 40 inches deep to hard bedrock; on shoulders
• Soils that are similar to the Chirpchatter soil but are less than 40 inches deep to bedrock; on back slopes
• Soils that are similar to the Hunsinger soil but are less than 40 inches deep to bedrock; on shoulders

Use and Management

Land use: Timber production or homesite development

Woodland vegetation on the Hunsinger soil

Main tree species: Ponderosa pine, incense cedar, California black oak
Mean site index for stated species: Ponderosa pine—75
Dunning site class: 3
CACTOS site index: 54
Common understory plants: Squawcarpet, bluegrass, needlegrass, greenleaf manzanita, Idaho fescue, antelope bitterbrush

Woodland vegetation on the Chirpchatter soil

Main tree species: Ponderosa pine, Oregon white oak, California black oak, incense cedar
Mean site index for stated species: Ponderosa pine—75
Dunning site class: 4
CACTOS site index: 49
Common understory plants: Mountain big sagebrush, squawcarpet, greenleaf manzanita, buckbrush, antelope bitterbrush

Timber production

Major management factors: Hunsinger—compaction hazard, limited available water capacity, plant competition; Chirpchatter—water erosion, compaction hazard, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 35 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The limited available water capacity in the upper 24 inches of the soil reduces the rate of seedling survival and hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.

• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir and ponderosa pine.

Homesite development

Major management factors: Hunsinger—slope, restricted permeability; Chirpchatter—water erosion, slope
Management considerations:
• Maintaining a permanent cover of vegetation on about 35 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• During construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.
• If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.
• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Hunsinger—IVe-7, nonirrigated; Chirpchatter—IVe-1, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Hunsinger—4F; Chirpchatter—4S

189—Hunsinger-Chirpchatter complex, 30 to 50 percent slopes

Setting

Landform: Mountains
Elevation: 4,800 to 5,000 feet
Slope range: 30 to 50 percent
Vegetation: Ponderosa pine, oak, shrubs, and grasses
Mean annual precipitation: 16 to 25 inches
Mean annual air temperature: 45 to 47 degrees F
Mean annual soil temperature: 47 to 49 degrees F
Frost-free period: 80 to 90 days

Composition

Hunsinger and similar soils: 55 percent
Chirpchatter and similar soils: 25 percent
Contrasting inclusions: 20 percent

Characteristics of the Hunsinger Soil

Position on the landscape: Back slopes and escarpments
Parent material: Colluvium from extrusive igneous rock
Typical profile:
0 to 9 inches—brown gravelly sandy loam
9 to 40 inches—brown very cobbly sandy clay loam
40 inches—strongly weathered basalt
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Low
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Moderate or high

Characteristics of the Chirpchatter Soil

Position on the landscape: Back slopes and foot slopes
Parent material: Older ashfalls
Typical profile:
2 inches to 0—duff
0 to 15 inches—brown and dark yellowish brown sandy loam
15 to 70 inches—brown sandy clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: High

Contrasting Inclusions

• Boardburn soils, which are more than 60 inches deep to weathered bedrock and have less than 35 percent clay in the subsoil; on toe slopes
• Hambone soils, which are 40 to 60 inches deep to weathered bedrock and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on back slopes
• Soils that are similar to the Chirpchatter soil but are less than 40 inches deep to bedrock; on back slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Hunsinger soil

Main tree species: Ponderosa pine, California black oak, incense cedar
Mean site index for stated species: Ponderosa pine—75
Dunning site class: 3
CACTOS site index: 54
Common understory plants: Squawcarpet, bluegrass, needlegrass, greenleaf manzanita, Idaho fescue, antelope bitterbrush

Woodland vegetation on the Chirpchatter soil

Main tree species: Ponderosa pine, incense cedar, Oregon white oak, California black oak
Mean site index for stated species: Ponderosa pine—75
Dunning site class: 4
CACTOS site index: 49
Common understory plants: Mountain big sagebrush, squawcarpet, greenleaf manzanita, buckbrush, antelope bitterbrush

Timber production

Major management factors: Hunsinger—slope, water erosion, compaction hazard, limited available water capacity, plant competition, hazard of fire damage; Chirpchatter—slope, water erosion, compaction hazard, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• The slope limits the kinds of equipment that can be used in forest management.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The limited available water capacity in the upper 24 inches of the soil reduces the rate of seedling survival and hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir and ponderosa pine.

Interpretive Groups

Land capability classification: Hunsinger and Chirpchatter—VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Hunsinger and Chirpchatter—4R

190—Jacksback loam, 2 to 9 percent slopes

Setting

Landform: Stream terraces
Elevation: 4,700 to 5,000 feet
Slope range: 2 to 9 percent
Vegetation: Lodgepole pine and Douglas spirea
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 39 to 41 degrees F
Mean annual soil temperature: 41 to 45 degrees F
Frost-free period: 50 to 80 days

Composition

Jacksback and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Jacksback Soil

Parent material: Alluvium from andesitic rock
Typical profile:
0 to 21 inches—brown loam
21 to 42 inches—mottled pale brown and yellowish brown sandy clay loam

42 to 52 inches—mottled light yellowish brown sandy loam
52 to 75 inches—mottled very pale brown very fine sandy loam, coarse sandy loam, and sandy loam
75 to 80 inches—mottled very pale brown silt loam
Depth class: Very deep
Drainage class: Poorly drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Moderate
Surface runoff: Very slow or slow
Depth to bedrock: More than 60 inches
Water table: At the surface to 36 inches below the surface from March through May; at a depth of more than 40 inches from June through November
Frequency of flooding: Rare for brief periods from March through June
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Cobbly and gravelly outwash in stream channels
• Gardens soils, which have a silica-cemented substratum; in stream channels
• Gardens soils, which have a light colored surface layer; in stream channels
• Nanny soils, which have more than 35 percent rock fragments in the profile; in stream channels
• Soils that have more than 35 percent well rounded cobbles and stones; on toe slopes
• Soils that have soft bedrock at a depth of 40 to 60 inches; on foot slopes
• Soils that have very gravelly or very cobbly surface textures; on toe slopes
• Stream channels

Use and Management

Land use: Timber production or wetland wildlife habitat

Woodland vegetation

Main tree species: Lodgepole pine, quaking aspen, white fir
Mean site index for stated species: Lodgepole pine—86
Dunning site class: XX
Common understory plants: Douglas spirea, serviceberry, western huckleberry, skunkbush sumac, rose

Timber production

Major management factors: Water erosion, high water table, compaction hazard, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• The high water table limits the survival of native trees and shrubs. Plant roots cannot survive extended periods of high water. Species that are adapted to wet sites, such as willows, cottonwoods, and aspens, should be planted.
• During periods when the water table is near the surface, the use of equipment can be impaired. Culverts can help to overcome this limitation.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include lodgepole pine.

Wetland wildlife habitat

Management considerations:
• This unit can provide important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
• Drainage of wetlands in areas of this unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: Vw-2, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 5W

191—Jadpor gravelly sandy loam, 0 to 5 percent slopes

Setting

Landform: Stream terraces
Elevation: 3,100 to 3,200 feet
Slope range: 0 to 5 percent
Vegetation: Conifers, shrubs, and grasses
Mean annual precipitation: 25 to 30 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 50 to 80 days

Composition

Jadpor and similar soils: 90 percent
Contrasting inclusions: 10 percent

Characteristics of the Jadpor Soil

Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 20 inches—dark grayish brown gravelly sandy loam
20 to 32 inches—dark brown extremely cobbly sandy loam
32 to 50 inches—brown extremely cobbly sandy clay loam
50 to 64 inches—pale brown extremely cobbly coarse sandy loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Keddie soils, which have less than 35 percent rock fragments in the subsoil; on toe slopes
• Swanberger soils, which are clay throughout; on the lower toe slopes

Use and Management

Land use: Wood products or grazing

Woodland vegetation on the Jadpor soil

Main woodland species: Western juniper, Oregon white oak, California black oak, ponderosa pine
Mean site index for stated species: Ponderosa pine—93
Dunning site class: 2
CACTOS site index: 59
Common understory plants: Skunkbush sumac, deerbrush, needlegrass

Wood products

Major management factors: Rock fragments, compaction hazard, limited available water capacity
Management considerations:
• The rock fragments in the profile and the limited available water capacity hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.

Woodland grazing

Major management factors: Limited available water capacity
Management considerations:
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: IVs-4, irrigated and nonirrigated
MLRA: 22
Prime farmland: Considered prime farmland in drained areas that are protected from flooding
Woodland ordination symbol: 6F

192—Jadpor very gravelly sandy loam, 0 to 5 percent slopes

Setting

Landform: Stream terraces
Elevation: 2,700 to 3,100 feet
Slope range: 0 to 5 percent
Vegetation: Ponderosa pine, oak, shrubs, and grasses
Mean annual precipitation: 16 to 22 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 48 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Jadpor and similar soils: 85 percent

Contrasting inclusions: 15 percent

Characteristics of the Jadpor Soil

Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 5 inches—dark gray very gravelly sandy loam
5 to 12 inches—dark gray extremely cobbly sandy loam
12 to 23 inches—brown extremely cobbly sandy clay loam
23 to 61 inches—pale brown extremely cobbly coarse sandy loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Dotta soils, which have less than 35 percent clay in the subsoil; on toe slopes
• Esperanza soils, which have more than 35 percent clay in the subsoil; on toe slopes
• Soils that are less than 40 inches deep to bedrock of volcanic or diatomaceous material; on foot slopes
• Soils that do not have an argillic horizon; on back slopes
• Soils that have a surface layer of very cobbly sandy loam; on foot slopes

Use and Management

Land use: Wood products or grazing

Woodland vegetation on the Jadpor soil

Main woodland species: Western juniper, Oregon white oak, California black oak, ponderosa pine
Mean site index for stated species: Ponderosa pine—93
Dunning site class: 2
CACTOS site index: 59
Common understory plants: Skunkbush sumac, deerbrush, needlegrass

Wood products

Major management factors: Rock fragments, compaction hazard, limited available water capacity
Management considerations:
• The rock fragments in the profile and the limited available water capacity hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.

Woodland grazing

Major management factors: Limited available water capacity
Management considerations:
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: IVs-4, irrigated and nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 6F

193—Jahjo-Lava flows-Loveness complex, 2 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 4,200 to 4,400 feet
Slope range: 2 to 15 percent
Vegetation: Shrubs, grasses, and ponderosa pine
Mean annual precipitation: 16 to 25 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Jahjo and similar soils: 40 percent
Lava flows: 30 percent
Loveness and similar soils: 20 percent
Contrasting inclusions: 10 percent

Characteristics of the Jahjo Soil

Position on the landscape: Areas of lava flow outcrops and pockets between lava flow outcrops
Important surface feature: About 40 to 60 percent of the surface is covered with cobbles and stones.
Parent material: Tephra
Typical profile:
0 to 2 inches—brown extremely cobbly fine sandy loam

2 to 6 inches—brown fine sandy loam
6 to 12 inches—yellowish brown loam
12 inches—hard basalt
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: 4 to 14 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Lava Flows

• Lava flows are areas covered by geologically recent lava. They are characterized by sharp, jagged, broken blocks piled in tumbled heaps and many crevices, sinkholes, and collapsed lava tubes. Most areas support such plants as western juniper, ponderosa pine, antelope bitterbrush, and manzanita, but some areas are virtually devoid of vegetation.

Characteristics of the Loveness Soil

Position on the landscape: Toe slopes
Parent material: Tephra
Typical profile:
1 inch to 0—duff
0 to 7 inches—dark brown sandy loam
7 to 12 inches—reddish brown loam
12 to 19 inches—reddish brown gravelly loam
19 to 35 inches—yellowish red and strong brown gravelly clay loam
35 to 60 inches—strong brown extremely stony clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Longbell soils, which are more than 60 inches deep, have medial over sandy or sandy-skeletal material, and do not have an argillic horizon; in pockets between lava flow outcrops
• Soils that are similar to the Jahjo soil but are more than 14 inches deep to hard bedrock; on shoulders
• Soils that are similar to the Loveness soil but are less than 40 inches deep to hard bedrock; near lava flow outcrops
• Water holes in lava pockets

Use and Management

Land use: Wood products or grazing

Vegetation on the Jahjo soil

Common plants: Western needlegrass, antelope bitterbrush, mountain big sagebrush

Vegetation on the Lava flows

Common plants: Western chokecherry, quaking aspen, antelope bitterbrush, curlleaf mountainmahogany

Woodland vegetation on the Loveness soil

Main woodland species: Ponderosa pine, incense cedar, white fir
Mean site index for stated species: Ponderosa pine—82
Dunning site class: 3
CACTOS site index: 54
Common understory plants: Greenleaf manzanita, squawcarpet, squirreltail, snowbrush ceanothus, muleears

Wood products

Major management factors: Jahjo—rock fragments on the surface, limited available water capacity; Lava flows—rock fragments on the surface; Loveness—no major management concerns
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 13 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The rock fragments on the surface can interfere with the harvesting of wood products.
• Lava flows tend to interfere with felling and yarding and other uses of equipment. Traffic should be limited in these areas during harvesting activities.
• The limited available water capacity hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.

Woodland grazing

Major management factors: Jahjo—depth to rock, rock fragments, limited available water capacity; Lava flows—depth to rock; Loveness—water erosion
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 13 percent

of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils and Lava flows requires special design.
• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Because of the limited available water capacity, intensive management of grazing is necessary. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: Jahjo—VIIs, nonirrigated; Lava flows—VIII, nonirrigated; Loveness—IIIe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Loveness—5A
Range site: Jahjo—Sandy Loam, MAP 18+ (22d)

194—Jellico-Lava flows complex, 5 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 3,200 to 4,500 feet
Slope range: 5 to 15 percent
Vegetation: Juniper, conifers, oak, and shrubs
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Jellico and similar soils: 40 percent
Lava flows: 35 percent
Contrasting inclusions: 25 percent

Characteristics of the Jellico Soil

Position on the landscape: Toe slopes
Important surface feature: About 20 to 30 percent of the surface is covered with stones and cobbles.
Parent material: Tephra
Typical profile:
0 to 5 inches—yellowish brown very stony silt loam
5 to 27 inches—yellowish brown very cobbly silt loam and very stony silt loam
27 to 33 inches—light yellowish brown extremely stony silt loam
33 inches—hard basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Medium
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Lava Flows

• Lava flows are areas covered by geologically recent lava. They are characterized by sharp, jagged, broken blocks piled in tumbled heaps and many crevices, sinkholes, and collapsed lava tubes. Most areas support such plants as western juniper, ponderosa pine, antelope bitterbrush, and manzanita; some areas also support Modoc cypress. Some areas are virtually devoid of vegetation.

Contrasting Inclusions

• Coneward soils, which are more than 60 inches deep and have sandy textures; between lava flow outcrops
• Gassaway soils, which are less than 20 inches deep and have less than 35 percent clay in the subsoil; on escarpments and foot slopes
• Rubble land on escarpments
• Splawn soils, which have more than 35 percent clay in the subsoil; on toe slopes

Use and Management

Land use: Wood products or grazing

Woodland vegetation on the Jellico soil

Main woodland species: Oregon white oak, ponderosa pine, California black oak, Digger pine, western juniper
Mean site index for stated species: Ponderosa pine—62; western juniper—28
Dunning site class: 4
CACTOS site index: 43
Common understory plants: Bluebunch wheatgrass, antelope bitterbrush, bottlebrush squirreltail, Columbia needlegrass, mountainmahogany

Wood products

Major management factors: Jellico—rock fragments, compaction hazard; Lava flows—rock fragments
Management considerations:
• The rock fragments in the profile hinder establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant

plants should be considered when these areas are revegetated.
• The rock fragments on the surface can interfere with the harvesting of wood products.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.

Woodland grazing

Major management factors: Jellico—water erosion, rock fragments; Lava flows—rock fragments
Management considerations:
• Fence construction on Lava flows requires special design.
• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.

Interpretive Groups

Land capability classification: Jellico—VIs, nonirrigated; Lava flows—VIII, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Jellico—3F

195—Jellico-Splawn complex, 15 to 30 percent slopes

Setting

Landform: Hills
Elevation: 4,000 to 5,000 feet
Slope range: 15 to 30 percent
Vegetation: Junipers, pine, white oak, and shrubs
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Jellico and similar soils: 50 percent
Splawn and similar soils: 35 percent
Contrasting inclusions: 15 percent

Characteristics of the Jellico Soil

Position on the landscape: Side slopes
Important surface feature: About 20 to 30 percent of the surface is covered with stones and cobbles.
Parent material: Tephra
Typical profile:
0 to 6 inches—yellowish brown very stony silt loam
6 to 23 inches—yellowish brown very cobbly silt loam
23 to 33 inches—hard basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Moderate or high

Characteristics of the Splawn Soil

Position on the landscape: Foot slopes
Important surface feature: About 20 to 40 percent of the surface is covered with cobbles and stones.
Parent material: Slope alluvium from basalt
Typical profile:
0 to 3 inches—brown very cobbly loam
3 to 10 inches—brown very gravelly loam
10 to 17 inches—very gravelly clay loam
17 to 24 inches—strong brown extremely gravelly clay loam
24 inches—hard basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

• Jellycamp soils, which are less than 20 inches deep to a hardpan over hard bedrock and have more than 35 percent clay in the subsoil; on foot slopes
• Lava flow outcrops; on shoulders
• Longcreek soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent clay and rock fragments in the subsoil; near escarpments
• Vansickle soils, which are less than 20 inches deep to a hardpan over hard bedrock and have more than 35 percent clay and rock fragments in the subsoil; on foot slopes

Use and Management

Land use: Wood products, livestock grazing, or homesite development

Woodland vegetation on the Jellico soil

Main woodland species: Digger pine, western juniper,

California black oak, ponderosa pine, Oregon white oak
Mean site index for stated species: Western juniper—28; ponderosa pine—62
Dunning site class: 4
CACTOS site index: 43
Common understory plants: Mountainmahogany, antelope bitterbrush, Columbia needlegrass, bluebunch wheatgrass, bottlebrush squirreltail

Vegetation on the Splawn Soil

Common plants: Idaho fescue, bottlebrush squirreltail, bluebunch wheatgrass, junegrass, Thurber needlegrass

Wood products

Major management factors: Water erosion, rock fragments, compaction hazard
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 50 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The rock fragments in the profile hinder planting efforts in areas where the subsoil is exposed or disturbed. Appropriate tools and techniques should be used.
• The rock fragments on the surface can interfere with the harvesting of wood products.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.

Woodland grazing

Major management factors: Water erosion, rock fragments, frost heaving
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Forage production is limited by rock fragments on the surface. If seeding is desired, species that are adapted to droughty conditions should be considered.
• The rock fragments on the surface limit access by equipment and may limit some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Frost heaving forces bunchgrasses and sagebrush above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.

Homesite development

Major management factors: Jellico—water erosion, slope, depth to rock, large stones; Splawn—water erosion, slope, depth to rock
Management considerations:
• Maintaining a permanent cover of vegetation on about 50 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• During construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.
• Because of the large stones, digging the trenches for the foundation may be difficult. If too many large stones are on the surface, hand digging may be necessary.
• If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.
• The limited depth to rock inhibits the filtering capacity of the leach fields or can prevent their placement. If the leach lines are placed too close to the bedrock, ground water may be contaminated by the effluent.
• Large stones can make the installation of the leach field difficult and can reduce the filtering capacity. Increasing the size of the leach field can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Jellico—VIs, nonirrigated; Splawn—IVs-7, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Jellico—3F

196—Jellico-Splawn complex, 30 to 50 percent slopes

Setting

Landform: Hills
Elevation: 4,000 to 5,000 feet
Slope range: 30 to 50 percent
Vegetation: Junipers, pine, white oak, and shrubs
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 52 degrees F

Frost-free period: 80 to 100 days

Composition

Jellico and similar soils: 50 percent
Splawn and similar soils: 35 percent
Contrasting inclusions: 15 percent

Characteristics of the Jellico Soil

Position on the landscape: Side slopes
Important surface feature: About 20 to 30 percent of the surface is covered with stones and cobbles.
Parent material: Tephra
Typical profile:
0 to 5 inches—yellowish brown very stony silt loam
5 to 27 inches—yellowish brown very cobbly silt loam and very cobbly silt loam
27 to 33 inches—yellowish brown extremely stony silt loam
33 inches—hard basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: High

Characteristics of the Splawn Soil

Position on the landscape: Foot slopes
Important surface feature: About 20 to 40 percent of the surface is covered with cobbles and stones.
Parent material: Slope alluvium from basalt
Typical profile:
0 to 8 inches—brown very cobbly loam
8 to 15 inches—brown very gravelly clay loam
15 to 28 inches—brown extremely gravelly clay and yellow extremely gravelly clay
28 inches—hard basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Moderate or high

Contrasting Inclusions

• Longcreek soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent clay and rock fragments in the subsoil; on shoulders
• Rubble land; on shoulders
• Searvar soils, which are 20 to 40 inches deep to weathered bedrock and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on shoulders

Use and Management

Land use: Wood products on the Jellico soil; grazing on both soils

Woodland vegetation on the Jellico soil

Main woodland species: Western juniper, California black oak, Digger pine, Oregon white oak, ponderosa pine
Mean site index for stated species: Western juniper—28; ponderosa pine—62
Dunning site class: 4
CACTOS site index: 43
Common understory plants: Bluebunch wheatgrass, rabbitbrush, Sandberg bluegrass, bottlebrush squirreltail, mountainmahogany, Idaho fescue, antelope bitterbrush, Columbia needlegrass

Vegetation on the Splawn soil

Common plants: Bluebunch wheatgrass, junegrass, bottlebrush squirreltail, Idaho fescue, other perennial forbs, Thurber needlegrass

Wood products

Major management factors: Water erosion, slope, rock fragments, compaction hazard
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• Roads and trails can be protected from erosion by constructing water bars.
• The slope limits the kinds of equipment that can be used in harvesting wood products.
• The rock fragments in the profile hinder planting efforts in areas where the subsoil is exposed or disturbed. Appropriate tools and techniques should be used.
• The rock fragments on the surface can interfere with the harvesting of wood products.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water

infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.

Woodland grazing

Major management factors: Jellico—water erosion, slope, rock fragments; Splawn—water erosion, slope, rock fragments, limited available water capacity
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The slope can limit access by equipment and some kinds of livestock. Fencing, water development, and forage supplements can improve livestock distribution.
• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: Jellico and Splawn—VIe, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Jellico—3R

197—Jellycamp extremely gravelly sandy loam, 2 to 5 percent slopes

Setting

Landform: Lava plateaus
Elevation: 5,600 to 5,800 feet
Slope range: 2 to 5 percent
Vegetation: Grasses and low sagebrush
Mean annual precipitation: 16 to 18 inches
Mean annual air temperature: 45 to 47 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 50 to 80 days

Composition

Jellycamp and similar soils: 80 percent
Contrasting inclusions: 20 percent

Characteristics of the Jellycamp Soil

Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 3 inches—grayish brown extremely gravelly sandy loam
3 to 9 inches—brown loam
9 to 19 inches—brown and strong brown clay
19 to 30 inches—hardpan
30 inches—hard basalt
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Very slow
Available water capacity: Low
Highest shrink-swell potential: Very high
Surface runoff: Slow
Depth to claypan: 5 to 10 inches
Depth to hardpan: 10 to 20 inches
Depth to bedrock: 15 to 35 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Patburn soils, which are more than 60 inches deep; near stream channels
• Soils that are more than 20 inches deep to a hardpan; on mounds
• Vansickle soils, which are less than 20 inches deep and have more than 35 percent rock fragments in the profile; near escarpments

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants: Junegrass, low sagebrush, Idaho fescue
Major management factors: Cemented pan, depth to rock, frost heaving
Management considerations:
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• Frost heaving forces bunchgrasses and sagebrush above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.

Interpretive Groups

Land capability classification: VIIs, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Shallow Cool Gravelly Loam, MAP 16-18 (21e)

198—Jellycamp-Karcal-Longcreek complex, 2 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 4,000 to 4,600 feet
Slope range: 2 to 15 percent
Vegetation: Grasses and low sagebrush
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 47 to 48 degrees F
Mean annual soil temperature: 48 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Jellycamp and similar soils: 35 percent
Karcal and similar soils: 30 percent
Longcreek and similar soils: 20 percent
Contrasting inclusions: 15 percent

Characteristics of the Jellycamp Soil

Position on the landscape: Intermounds
Important surface feature: About 20 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Alluvium from extrusive igneous rock
Slope: 2 to 9 percent
Typical profile:
0 to 7 inches—brown very cobbly loam
7 to 19 inches—yellowish brown clay
19 to 30 inches—hardpan
30 inches—hard basalt
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Very slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Slow or medium
Depth to claypan: 5 to 10 inches
Depth to hardpan: 10 to 20 inches
Depth to bedrock: 12 to 60 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Karcal Soil

Position on the landscape: Intermounds
Important surface feature: About 5 to 10 percent of the surface is covered with cobbles and stones.
Parent material: Alluvium from basalt and tuff
Slope: 2 to 9 percent
Typical profile:
0 to 15 inches—brown cobbly silty clay
15 to 29 inches—brown silty clay
29 inches—tuff
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: High
Surface runoff: Slow or medium
Depth to bedrock: 20 to 30 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Longcreek Soil

Position on the landscape: Escarpments
Important surface feature: About 30 to 50 percent of the surface is covered with stones and cobbles.
Parent material: Slope alluvium from extrusive igneous rock
Slope: 5 to 15 percent
Typical profile:
0 to 2 inches—brown very cobbly loam
2 to 8 inches—brown very cobbly clay loam
8 to 13 inches—brown very cobbly clay
13 inches—hard basalt
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Very low
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to claypan: 5 to 15 inches
Depth to bedrock: 14 to 20 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

- Cuppy soils, which are 20 to 40 inches deep to hard bedrock and have more than 35 percent clay throughout; on toe slopes
- Deven soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent clay in the subsoil; on toe slopes
- Fiddler soils, which are 20 to 40 inches deep to hard bedrock; on toe slopes
- Vansickle soils, which are less than 20 inches deep to a hardpan over hard bedrock; on escarpments
- Whitinger soils, which are 20 to 40 inches deep to hard bedrock; on shoulders

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants on the Jellycamp soil: Low sagebrush, Wright buckwheat, bluebunch wheatgrass, Thurber needlegrass
Common plants on the Karcal soil: Low sagebrush, bottlebrush squirreltail, bluebunch wheatgrass

Common plants on the Longcreek soil: Mountain big sagebrush, rubber rabbitbrush, Thurber needlegrass, bluebunch wheatgrass
Major management factors: Jellycamp—cemented pan, depth to rock, rock fragments on the surface, frost heaving, limited available water capacity; Karcal—shrink-swell; Longcreek—water erosion, depth to rock, rock fragments on the surface, frost heaving, limited available water capacity
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Forage production is limited by the shallow rooting depth, rock fragments on the surface, and the shrink-swell potential. If seeding is desired, species that are adapted to droughty conditions and to shrinking and swelling of the soil should be considered.
• Frost heaving forces bunchgrasses and sagebrush above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: Jellycamp—VIIs, nonirrigated; Karcal—VIs, nonirrigated; Longcreek—VIIs, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Jellycamp—Shallow Very Stony Loam, MAP 14-18 (21e); Karcal—Shallow Cobbly Clay, MAP 14-16 (21e); Longcreek—Stony Loam, MAP 14-18 (21e)

199—Jellycamp-Karcal-Longcreek complex, cool, 2 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 4,600 to 5,800 feet
Slope range: 2 to 15 percent
Vegetation: Grasses and low sagebrush
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 45 to 47 degrees F
Mean annual soil temperature: 47 to 49 degrees F
Frost-free period: 50 to 80 days

Composition

Jellycamp and similar soils: 35 percent
Karcal and similar soils: 30 percent
Longcreek and similar soils: 20 percent
Contrasting inclusions: 15 percent

Characteristics of the Jellycamp Soil

Position on the landscape: Mounds
Important surface feature: About 20 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Alluvium from extrusive igneous rock
Slope: 2 to 9 percent
Typical profile:
0 to 7 inches—brown very cobbly loam
7 to 19 inches—yellowish brown clay
19 to 30 inches—hardpan
30 inches—hard basalt
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Very slow
Available water capacity: Low
Highest shrink-swell potential: High
Surface runoff: Slow or medium
Depth to claypan: 5 to 10 inches
Depth to hardpan: 10 to 20 inches
Depth to bedrock: 12 to 60 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Karcal Soil

Position on the landscape: Toe slopes
Important surface feature: About 5 to 10 percent of the surface is covered with cobbles and stones.
Parent material: Alluvium from basalt and tuff
Slope: 2 to 9 percent
Typical profile:
0 to 15 inches—brown cobbly silty clay
15 to 29 inches—brown silty clay
29 inches—tuff

Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: High
Surface runoff: Slow or medium
Depth to bedrock: 20 to 30 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Longcreek Soil

Position on the landscape: Escarpments
Important surface feature: About 30 to 50 percent of the surface is covered with stones and cobbles.
Parent material: Slope alluvium from extrusive igneous rock
Slope: 5 to 15 percent
Typical profile:
0 to 3 inches—dark grayish brown very stony loam
3 to 16 inches—brown very cobbly clay loam
16 inches—tuff
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Very low
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to claypan: 5 to 15 inches
Depth to bedrock: 14 to 20 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Cuppy soils, which are 20 to 40 inches deep to a hardpan over hard bedrock and are clay throughout; on intermounds
• Deven soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent clay in the subsoil; on toe slopes
• Fiddler soils, which are 20 to 40 inches deep and have more than 35 percent clay and rock fragments in the subsoil; on toe slopes
• Vansickle soils, which are less than 20 inches deep and have more than 35 percent clay and rock fragments in the subsoil; on intermounds
• Whitinger soils, which are 20 to 40 inches deep and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on shoulders

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants on the Jellycamp soil: Low sagebrush, Thurber needlegrass, bluebunch wheatgrass, Idaho fescue
Common plants on the Karcal soil: Low sagebrush, bottlebrush squirreltail, bluebunch wheatgrass
Common plants on the Longcreek soil: Mountain big sagebrush, rubber rabbitbrush, Thurber needlegrass, bluebunch wheatgrass
Major management factors: Jellycamp—cemented pan, depth to rock, rock fragments on the surface, frost heaving; Karcal—shrink-swell; Longcreek—water erosion, depth to rock, rock fragments on the surface, frost heaving
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Forage production is limited by the shallow rooting depth, rock fragments on the surface, and the shrink-swell potential. If seeding is desired, species that are adapted to droughty conditions and to shrinking and swelling of the soil should be considered.
• Fence construction on shallow soils requires special design.
• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Frost heaving forces bunchgrasses and sagebrush above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: Jellycamp—VIIs, nonirrigated; Karcal—VIs, nonirrigated; Longcreek—VIIs, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Jellycamp—Shallow Cobbly Clay, MAP 14-16 (21e); Karcal—Shallow Cobbly Clay, MAP 14-16 (21e); Longcreek—Stony Loam, MAP 14-18 (21e)

200—Jellycamp-Lassen-Longcreek complex, 2 to 15 percent slopes

Setting

Landform: Lava plateaus

Elevation: 4,000 to 5,400 feet
Slope range: 2 to 15 percent
Vegetation: Grasses and low sagebrush
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 47 to 48 degrees F
Mean annual soil temperature: 48 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Jellycamp and similar soils: 35 percent
Lassen and similar soils: 30 percent
Longcreek and similar soils: 20 percent
Contrasting inclusions: 15 percent

Characteristics of the Jellycamp Soil

Position on the landscape: Mounds
Important surface feature: About 20 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 3 inches—brown very cobbly loam
3 to 18 inches—brown clay
18 to 38 inches—hardpan
38 inches—hard basalt
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Very slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Slow or medium
Depth to claypan: 5 to 10 inches
Depth to hardpan: 10 to 20 inches
Depth to bedrock: 12 to 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Lassen Soil

Position on the landscape: Intermounds
Important surface feature: About 5 to 10 percent of the surface is covered with cobbles and stones.
Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 3 inches—dark brown cobbly clay
3 to 28 inches—dark grayish brown and dark brown clay
28 inches—hard basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: High
Surface runoff: Slow or medium
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Longcreek Soil

Position on the landscape: Foot slopes
Important surface feature: About 30 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
0 to 3 inches—brown very cobbly loam
3 to 16 inches—brown very cobbly clay loam
16 inches—fractured basalt
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to claypan: 5 to 10 inches
Depth to bedrock: 14 to 20 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

- Cuppy soils, which are 20 to 40 inches deep to a hardpan over hard bedrock and have more than 35 percent clay in the subsoil; in intermounds
- Deven soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent clay in the subsoil; on toe slopes
- Jellico soils, which are 20 to 40 inches deep to hard bedrock and have less than 35 percent clay in the subsoil; on escarpments
- Splawn soils, which are 20 to 40 inches deep to hard bedrock and have more than 35 percent rock fragments in the profile; near escarpments
- Vansickle soils, which have more than 35 percent rock fragments in the profile; on escarpments

Use and Management

Land use: Livestock grazing or homesite development

Livestock grazing

Common plants on the Jellycamp soil: Wright buckwheat, Thurber needlegrass, bluebunch wheatgrass, low sagebrush
Common plants on the Lassen soil: Mountain brome, mountain big sagebrush, rubber rabbitbrush, bluebunch wheatgrass, bottlebrush squirreltail, Lemmon needlegrass
Common plants on the Longcreek soil: Mountain big sagebrush, rubber rabbitbrush, Thurber needlegrass, bluebunch wheatgrass
Major management factors: Jellycamp—water

erosion, cemented pan, depth to rock, rock fragments, frost heaving, limited available water capacity; Lassen—shrink-swell; Longcreek—water erosion, depth to rock, rock fragments, limited available water capacity

Management considerations:

• Maintaining a cover of vegetation, such as grass and brush, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.

• Forage production is limited by the shallow rooting depth, rock fragments on the surface, and the shrink-swell potential. If seeding is desired, species that are adapted to droughty conditions and to shrinking and swelling of the soil should be considered.

• Fence construction on shallow soils requires special design.

• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.

• Frost heaving forces bunchgrasses and sagebrush above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.

• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect plant composition and vigor.

Homesite development

Major management factors: Jellycamp—water erosion, cemented pan, depth to rock; Lassen—depth to rock, shrink-swell, restricted permeability; Longcreek—water erosion, depth to rock

Management considerations:

• Maintaining a permanent cover of vegetation on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.

• The cemented pan or bedrock can make a good base for the foundation.

• Using frequent irrigation cycles and controlled application rates helps to prevent a perched water table. If deep-rooted plants, such as trees, are planted, the cemented pan should be ripped or broken.

• The effects of shrinking and swelling can be minimized by using proper engineering designs or backfilling with material that has a low shrink-swell potential.

• The cemented pan reduces the volume of soil that is available for filtering effluent. Tests should be made below the pan depth to determine whether the lines should be placed at this depth.

• The cemented pan and the depth to rock inhibit the filtering capacity of the leach fields or can prevent their placement. If the leach lines are placed too close to the bedrock, ground water may be contaminated by the effluent.

• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.

• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Jellycamp—VIIs, nonirrigated; Lassen—IVe-5, nonirrigated; Longcreek—VIIs, nonirrigated

MLRA: 21

Prime farmland: Not considered prime farmland

Range site: Jellycamp—Shallow Very Stony Loam, MAP 14-18 (21e); Lassen—Cobbly Clay, MAP 14-16 (21e); Longcreek—Stony Loam, MAP 14-18 (21e)

201—Jellycamp-Ollierivas complex, 2 to 9 percent slopes

Setting

Landform: Lava plateaus
Elevation: 3,400 to 4,200 feet
Slope range: 2 to 9 percent
Vegetation: Grasses and low sagebrush
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Jellycamp and similar soils: 40 percent
Ollierivas and similar soils: 35 percent
Contrasting inclusions: 25 percent

Characteristics of the Jellycamp Soil

Position on the landscape: Intermounds (fig. 7)
Important surface feature: About 20 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 3 inches—brown very cobbly loam
3 to 6 inches—brown loam
6 to 11 inches—brown clay
11 to 16 inches—hardpan

16 inches—hard basalt
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Very slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Medium
Depth to claypan: 5 to 10 inches
Depth to hardpan: 10 to 20 inches
Depth to bedrock: 12 to 60 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Ollierivas Soil

Position on the landscape: Mounds
Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 5 inches—brown loam
5 to 23 inches—brown and dark yellowish brown clay loam
23 to 31 inches—hardpan
31 inches—hard basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: High
Surface runoff: Medium
Depth to claypan: 5 to 15 inches
Depth to hardpan: 20 to 40 inches
Depth to bedrock: 30 to 50 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Longcreek soils, which are less than 20 inches deep to hard bedrock; on escarpments
• Oxendine soils, which are less than 20 inches deep to hard bedrock and have less than 35 percent clay in the subsoil; in intermounds
• Soils that are similar to the Ollierivas soil but have more than 35 percent rock fragments in the profile; on mounds
• Vansickle soils, which are less than 20 inches deep to a hardpan and have more than 35 percent rock fragments in the subsoil; in intermounds

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants on the Jellycamp soil: Low sagebrush, Wright buckwheat, Thurber needlegrass, bluebunch wheatgrass
Common plants on the Ollierivas soil: Low sagebrush, bottlebrush squirreltail, bluegrass
Major management factors: Jellycamp—cemented pan, depth to rock, rock fragments, frost heaving, limited available water capacity; Ollierivas—water erosion
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 30 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Frost heaving forces bunchgrasses and sagebrush above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: Jellycamp—VIIs, nonirrigated; Ollierivas—IVe-3, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Jellycamp—Shallow Very Stony Loam, MAP 14-18 (21e); Ollierivas—Shallow Loam, MAP 14-18 (21e)

202—Jellycamp-Splawn-Ollierivas complex, 2 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 3,400 to 4,400 feet
Slope range: 2 to 15 percent
Vegetation: Jellycamp and Ollierivas—grasses and low sagebrush; Splawn—western juniper and grasses
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 50 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Jellycamp and similar soils: 35 percent
Splawn and similar soils: 25 percent
Ollierivas and similar soils: 25 percent
Contrasting inclusions: 15 percent

Characteristics of the Jellycamp Soil

Position on the landscape: Intermounds
Important surface feature: About 20 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 3 inches—brown very cobbly loam
3 to 6 inches—brown loam
6 to 11 inches—brown clay
11 to 31 inches—hardpan
31 inches—hard basalt
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Very slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Slow or medium
Depth to claypan: 5 to 10 inches
Depth to hardpan: 10 to 20 inches
Depth to bedrock: 12 to 60 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Splawn Soil

Position on the landscape: Toe slopes
Important surface feature: About 20 to 40 percent of the surface is covered with cobbles and stones.
Parent material: Slope alluvium from basalt
Typical profile:
0 to 8 inches—brown very cobbly loam
8 to 15 inches—brown very gravelly clay loam
15 to 28 inches—brown extremely gravelly clay and yellow extremely gravelly clay loam
28 inches—hard basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Slow or medium
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Ollierivas Soil

Position on the landscape: Mounds
Parent material: Alluvium from extrusive igneous rock
Slope: 2 to 9 percent
Typical profile:
0 to 5 inches—brown loam
5 to 23 inches—brown and dark yellowish brown clay loam
23 to 31 inches—hardpan
31 inches—hard basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: High
Surface runoff: Slow or medium
Depth to claypan: 5 to 10 inches
Depth to hardpan: 20 to 40 inches
Depth to bedrock: 30 to 50 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

- Lava flow outcrops; on shoulders
- Longcreek soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent clay and rock fragments in the subsoil; on edges of escarpments
- Oxendine soils, which are less than 20 inches deep to a hardpan over hard bedrock and have less than 35 percent clay in the subsoil; in intermounds
- Vansickle soils, which have more than 35 percent clay and rock fragments in the subsoil; in intermounds

Use and Management

Land use: Jellycamp and Ollierivas—livestock grazing; Splawn—livestock grazing and wood products

Livestock grazing

Common plants on the Jellycamp soil: Wright buckwheat, bluebunch wheatgrass, Thurber needlegrass, low sagebrush
Common plants on the Ollierivas soil: Bottlebrush squirreltail, low sagebrush, bluegrass
Major management factors: Jellycamp—water erosion, cemented pan, depth to rock, rock fragments, frost heaving, limited available water capacity; Splawn—water erosion, rock fragments, limited available water capacity; Ollierivas—water erosion
Management considerations:
- Maintaining a cover of vegetation, such as grass and brush, on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.

• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Frost heaving forces bunchgrasses and sagebrush above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect plant composition and vigor.

Wood products

Main woodland species on the Splawn soil: Western juniper
Common understory plants on the Splawn soil: Idaho fescue, bottlebrush squirreltail, Thurber needlegrass
Major management factors: Splawn—rock fragments on the surface
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The rock fragments on the surface can interfere with the harvesting of wood products.

Interpretive Groups

Land capability classification: Jellycamp—VIIs, nonirrigated; Splawn—IVs-7, nonirrigated; Ollierivas—IVe-3, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Jellycamp—Shallow Very Stony Loam, MAP 14-18 (21e); Ollierivas—Shallow Loam, MAP 14-18 (21e)

203—Jellycamp-Splawn-Ricketts complex, 2 to 30 percent slopes

Setting

Landform: Lava plateaus
Elevation: 3,500 to 4,200 feet
Slope range: 2 to 30 percent
Vegetation: Grasses and low sagebrush
Mean annual precipitation: 12 to 18 inches
Mean annual air temperature: 47 to 49 degrees F
Mean annual soil temperature: 49 to 51 degrees F
Frost-free period: 80 to 100 days

Composition

Jellycamp and similar soils: 45 percent
Splawn and similar soils: 20 percent
Ricketts and similar soils: 20 percent
Contrasting inclusions: 15 percent

Characteristics of the Jellycamp Soil

Position on the landscape: Intermounds
Parent material: Alluvium from extrusive igneous rock
Slope: 2 to 5 percent
Typical profile:
0 to 5 inches—brown loam
5 to 12 inches—brown clay
12 to 19 inches—hardpan
19 inches—hard tuff
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Very slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Slow
Depth to claypan: 5 to 10 inches
Depth to hardpan: 10 to 20 inches
Depth to bedrock: 15 to 35 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Splawn Soil

Position on the landscape: Toe slopes
Important surface feature: About 20 to 40 percent of the surface is covered with cobbles and stones.
Parent material: Slope alluvium from basalt
Slope: 2 to 15 percent
Typical profile:
0 to 10 inches—yellowish brown very cobbly loam
10 to 17 inches—dark yellowish brown very gravelly clay loam
17 to 27 inches—brown extremely gravelly clay loam
27 inches—hard basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Slow or medium
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Ricketts Soil

Position on the landscape: Foot slopes

Important surface feature: About 20 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Colluvium from extrusive igneous rock
Slope: 15 to 30 percent
Typical profile:
0 to 10 inches—brown very cobbly loam
10 to 26 inches—brown very cobbly loam and very cobbly clay loam
26 inches—hard basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

• Lassen soils, which are 20 to 40 inches deep to hard bedrock and have more than 35 percent clay throughout; on toe slopes
• Longcreek soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent clay and rock fragments in the subsoil; on shoulders
• Soils that are similar to the Splawn soil but have an abrupt textural change in the profile; on foot slopes
• Soils that are similar to the Splawn soil but have less than 35 percent rock fragments in the profile; on foot slopes

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants on the Jellycamp soil: Bottlebrush squirreltail, low sagebrush, bluegrass
Common plants on the Splawn soil: Idaho fescue, Thurber needlegrass, bottlebrush squirreltail
Common plants on the Ricketts soil: Bluebunch wheatgrass, rubber rabbitbrush, mountain big sagebrush, Lemmon needlegrass
Major management factors: Jellycamp—cemented pan, depth to rock, frost heaving, limited available water capacity; Splawn and Ricketts—water erosion, rock fragments on the surface, limited available water capacity
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 26 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Frost heaving forces bunchgrasses and sagebrush above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: Jellycamp—VIIs, nonirrigated; Splawn—IVs-7, nonirrigated; Ricketts—IVs-7, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Jellycamp—Shallow Loam, MAP 14-18 (21e); Ricketts—Cobbly Loam, MAP 14-16 (21e)

204—Jellycamp-Vansickle complex, very cobbly loam, 2 to 9 percent slopes

Setting

Landform: Lava plateaus
Elevation: 4,400 to 5,400 feet
Slope range: 2 to 9 percent
Vegetation: Grasses and low sagebrush
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Jellycamp and similar soils: 60 percent
Vansickle and similar soils: 25 percent
Contrasting inclusions: 15 percent

Characteristics of the Jellycamp Soil

Position on the landscape: Intermounds
Important surface feature: About 20 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 11 inches—grayish brown very cobbly loam
11 to 20 inches—brown clay
20 to 35 inches—hardpan

35 inches—hard basalt
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Very slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Slow or medium
Depth to claypan: 5 to 10 inches
Depth to hardpan: 10 to 20 inches
Depth to bedrock: 12 to 60 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Vansickle Soil

Position on the landscape: Mounds
Important surface feature: About 40 to 60 percent of the surface is covered with cobbles and stones.
Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 10 inches—brown very cobbly loam
10 to 16 inches—yellowish brown very cobbly clay
16 to 18 inches—hardpan
18 inches—unweathered basalt
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Slow or medium
Depth to claypan: 2 to 5 inches
Depth to hardpan: 10 to 20 inches
Depth to bedrock: 11 to 30 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Lassen soils, which are 20 to 40 inches deep to hard bedrock; on toe slopes
• Longcreek soils, which are less than 20 inches deep to hard bedrock; on escarpments

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants on the Jellycamp soil: Wright buckwheat, bluebunch wheatgrass, Thurber needlegrass, low sagebrush
Common plants on the Vansickle soil: Low sagebrush, Thurber needlegrass, bluebunch wheatgrass
Major management factors: Cemented pan, depth to rock, rock fragments on the surface, frost heaving, limited available water capacity
Management considerations:
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Frost heaving forces bunchgrasses and sagebrush above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.
• Because of the limited available water capacity, intensive management is needed. Grazing frequency and duration can affect plant composition and vigor.

Interpretive Groups

Land capability classification: Jellycamp and Vansickle—VIIs, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Jellycamp—Shallow Very Stony Loam, MAP 14-18 (21e); Vansickle—Shallow Cobbly Loam, MAP 14-16 (21e)

205—Jellycamp-Vansickle complex, extremely stony loam, 2 to 9 percent slopes

Setting

Landform: Lava plateaus
Elevation: 5,500 to 5,700 feet
Slope range: 2 to 9 percent
Vegetation: Grasses and low sagebrush
Mean annual precipitation: 16 to 18 inches
Mean annual air temperature: 45 to 50 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 50 to 80 days

Composition

Jellycamp and similar soils: 60 percent
Vansickle and similar soils: 30 percent
Contrasting inclusions: 10 percent

Characteristics of the Jellycamp Soil

Position on the landscape: Intermounds
Important surface feature: About 50 to 80 percent of the surface is covered with stones and cobbles.
Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 5 inches—brown extremely stony loam
5 to 12 inches—brown clay
12 to 27 inches—hardpan

27 inches—hard basalt
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Very slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Slow or medium
Depth to claypan: 5 to 10 inches
Depth to hardpan: 10 to 20 inches
Depth to bedrock: 12 to 60 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Vansickle Soil

Position on the landscape: Mounds
Important surface feature: About 50 to 80 percent of the surface is covered with stones and cobbles.
Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 6 inches—dark grayish brown extremely stony loam
6 to 20 inches—dark reddish gray very cobbly clay
20 to 24 inches—hardpan
24 inches—unweathered basalt
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Slow or medium
Depth to claypan: 2 to 5 inches
Depth to hardpan: 10 to 20 inches
Depth to bedrock: 11 to 30 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Lassen soils, which are 20 to 40 inches deep to hard bedrock; on toe slopes
• Rock outcrop; on shoulders

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants: Thurber needlegrass, bluebunch wheatgrass, Idaho fescue, low sagebrush
Major management factors: Cemented pan, depth to rock, rock fragments on the surface, frost heaving, limited available water capacity
Management considerations:
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Frost heaving forces bunchgrasses and sagebrush above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.
• Because of the limited available water capacity, intensive management is needed. Grazing frequency and duration can affect plant composition and vigor.

Interpretive Groups

Land capability classification: Jellycamp and Vansickle—VIIs, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Jellycamp and Vansickle—Shallow Cool Very Stony Loam, MAP 16-18 (21e)

206—Jellycamp-Vansickle complex, warm, 2 to 9 percent slopes

Setting

Landform: Lava plateaus
Elevation: 4,300 to 5,000 feet
Slope range: 2 to 9 percent
Vegetation: Grasses and low sagebrush
Mean annual precipitation: 16 to 18 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 50 to 52 degrees F
Frost-free period: 100 to 110 days

Composition

Jellycamp and similar soils: 50 percent
Vansickle and similar soils: 45 percent
Contrasting inclusions: 5 percent

Characteristics of the Jellycamp Soil

Position on the landscape: Intermounds
Important surface feature: About 20 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 11 inches—grayish brown very cobbly loam
11 to 19 inches—yellowish brown clay
19 to 30 inches—hardpan
30 inches—hard basalt
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Very slow
Available water capacity: Very low
Highest shrink-swell potential: High

Surface runoff: Slow or medium
Depth to claypan: 5 to 10 inches
Depth to hardpan: 10 to 20 inches
Depth to bedrock: 12 to 60 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Vansickle Soil

Position on the landscape: Mounds
Important surface feature: About 50 to 80 percent of the surface is covered with stones and cobbles.
Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 6 inches—brown extremely stony loam
6 to 20 inches—yellowish brown very cobbly clay
20 to 30 inches—hardpan
30 inches—unweathered basalt
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Slow or medium
Depth to claypan: 2 to 5 inches
Depth to hardpan: 10 to 20 inches
Depth to bedrock: 11 to 30 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

- Lassen soils, which are 20 to 40 inches deep to hard bedrock; on toe slopes
- Longcreek soils, which are less than 20 inches deep to hard bedrock; on escarpments

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants on the Jellycamp soil: Wright buckwheat, Thurber needlegrass, bluebunch wheatgrass, low sagebrush
Common plants on the Vansickle soil: Low sagebrush, Thurber needlegrass, bluebunch wheatgrass
Major management factors: Depth to claypan, cemented pan, depth to rock, rock fragments on the surface, frost heaving, limited available water capacity
Management considerations:
- The claypan prevents water from moving through the profile rapidly. Wheeled equipment should not be used when the soil is saturated.
- Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
- Fence construction on shallow soils requires special design.
- The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
- Frost heaving forces bunchgrasses and sagebrush above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.
- Because of the limited available water capacity, intensive management is needed. Grazing frequency and duration are critical to plant maintenance.

Interpretive Groups

Land capability classification: Jellycamp and Vansickle—VIIs, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Jellycamp—Shallow Very Stony Loam, MAP 14-18 (21e); Vansickle—Shallow Cobbly Loam, MAP 14-16 (21e)

207—Jimmerson loam-Jimmerson stony sandy loam complex, 2 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 3,300 to 4,500 feet
Slope range: 2 to 15 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Jimmerson loam and similar soils: 60 percent
Jimmerson stony sandy loam and similar soils: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Jimmerson Loam

Position on the landscape: Toe slopes
Parent material: Old tephra deposits and material from lava flows
Typical profile:
1 inch to 0—duff
0 to 5 inches—reddish brown and yellowish red loam
5 to 24 inches—yellowish red loam and strong brown clay loam

24 to 50 inches—strong brown clay loam
50 to 62 inches—strong brown cobbly clay loam
62 to 70 inches—strong brown clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of Jimmerson Stony Sandy Loam

Position on the landscape: Foot slopes
Important surface feature: As much as 5 percent of the surface is covered with stones and cobbles.
Parent material: Old tephra deposits and material from lava flows
Typical profile:
2 inches to 0—duff
0 to 12 inches—brown and reddish brown stony sandy loam
12 to 20 inches—yellowish red cobbly loam
20 to 60 inches—yellowish red clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Very high
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

- Soils that are shallow over weathered bedrock; on shoulders
- Soils that are less than 60 inches deep to bedrock; on foot slopes
- Soils that are similar to Jimmerson stony sandy loam but have more than 35 percent rock fragments in the subsoil; on foot slopes
- Soils that have more than 35 percent clay throughout the subsoil; on toe slopes

Use and Management

Land use: Timber production or homesite development

Woodland vegetation on Jimmerson loam

Main tree species: Ponderosa pine, incense cedar, white fir, Douglas-fir, sugar pine
Mean site index for stated species: Ponderosa pine—93; Douglas-fir—106
Dunning site class: 2
CACTOS site index: 73
Common understory plants: Greenleaf manzanita, bitter cherry, deerbrush, serviceberry, squawcarpet, skunkbush sumac, snowbrush ceanothus

Woodland vegetation on Jimmerson stony sandy loam

Main tree species: Douglas-fir, ponderosa pine, white fir, sugar pine, incense cedar
Mean site index for stated species: Ponderosa pine—95; Douglas-fir—112
Dunning site class: 2
CACTOS site index: 73
Common understory plants: Greenleaf manzanita, Idaho fescue, skunkbush sumac, snowbrush ceanothus, squawcarpet, antelope bitterbrush, gooseberry, deerbrush

Timber production

Major management factors: Jimmerson loam—water erosion, compaction hazard, plant competition; Jimmerson stony sandy loam—compaction hazard, plant competition
Management considerations:
- Roads and landings can be protected from erosion by constructing water bars.
- The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
- Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
- Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
- Trees suitable for planting include sugar pine, ponderosa pine, and Douglas-fir.

Homesite development

Major management factors: Slope, shrink-swell, restricted permeability
Management considerations:
- During construction, all bare ground should be mulched. Establishing a ground cover helps to

prevent excessive erosion during periods of high rainfall.
• The effects of shrinking and swelling can be minimized by using proper engineering designs or backfilling with material that has a low shrink-swell potential.
• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Jimmerson loam—IIIe-4, nonirrigated; Jimmerson stony sandy loam—IVe-7, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Jimmerson loam—6A; Jimmerson stony sandy loam—7X

208—Jimmerson loam-Jimmerson stony sandy loam complex, 15 to 30 percent slopes

Setting

Landform: Lava plateaus and hills
Elevation: 3,300 to 4,500 feet
Slope range: 15 to 30 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Jimmerson loam and similar soils: 50 percent
Jimmerson stony sandy loam and similar soils: 40 percent
Contrasting inclusions: 10 percent

Characteristics of Jimmerson Loam

Position on the landscape: Side slopes
Parent material: Old tephra deposits and material from lava flows
Typical profile:
1 inch to 0—duff
0 to 5 inches—reddish brown and yellowish red loam
5 to 24 inches—yellowish red and strong brown loam
24 to 50 inches—strong brown clay loam
50 to 62 inches—strong brown cobbly clay loam
62 to 70 inches—strong brown clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of Jimmerson Stony Sandy Loam

Position on the landscape: Back slopes
Important surface feature: About 5 percent or less of the surface is covered with stones and cobbles.
Parent material: Old tephra deposits and material from lava flows
Typical profile:
2 inches to 0—duff
0 to 12 inches—brown and reddish brown stony sandy loam
12 to 20 inches—yellowish red cobbly loam
20 to 60 inches—yellowish red clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Very high
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Fault escarpments; on shoulders
• Rock outcrop; on shoulders
• Soils that are less than 60 inches deep to bedrock; on foot slopes

Use and Management

Land use: Timber production

Woodland vegetation on Jimmerson loam

Main tree species: Douglas-fir, white fir, sugar pine, ponderosa pine, incense cedar, white fir
Mean site index for stated species: Douglas-fir—106; ponderosa pine—93
Dunning site class: 2
CACTOS site index: 73
Common understory plants: Greenleaf manzanita, serviceberry, squawcarpet, skunkbush sumac, deerbrush, bitter cherry, snowbrush ceanothus

Woodland vegetation on Jimmerson stony sandy loam

Main tree species: Douglas-fir, ponderosa pine, incense cedar, white fir, sugar pine
Mean site index for stated species: Douglas-fir—112; ponderosa pine—95
Dunning site class: 2
CACTOS site index: 73
Common understory plants: Greenleaf manzanita, squawcarpet, antelope bitterbrush, gooseberry, snowbrush ceanothus, Idaho fescue, skunkbush sumac, gooseberry

Timber production

Major management factors: Water erosion, compaction hazard, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 25 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include sugar pine, ponderosa pine, and Douglas-fir.

Interpretive Groups

Land capability classification: Jimmerson loam—IVe-3, nonirrigated; Jimmerson stony sandy loam—IVe-7, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Jimmerson loam—6A; Jimmerson stony sandy loam—7X

209—Jimmerson stony loam-Jimmerson loam complex, 30 to 50 percent slopes

Setting

Landform: Hills
Elevation: 3,300 to 4,500 feet
Slope range: 30 to 50 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Jimmerson stony loam and similar soils: 60 percent
Jimmerson loam and similar soils: 20 percent
Contrasting inclusions: 20 percent

Characteristics of Jimmerson Stony Loam

Position on the landscape: Back slopes
Important surface feature: About 5 to 10 percent of the surface is covered with stones and cobbles.
Parent material: Old tephra deposits and material from lava flows
Typical profile:
2 inches to 0—duff
0 to 12 inches—brown and reddish brown stony loam
12 to 20 inches—yellowish red cobbly loam
20 to 60 inches—yellowish red clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Very high
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate or high

Characteristics of Jimmerson Loam

Position on the landscape: Side slopes
Parent material: Old tephra deposits and material from lava flows
Typical profile:
1 inch to 0—duff
0 to 5 inches—reddish brown and yellowish red loam
5 to 24 inches—yellowish red loam and strong brown clay loam
24 to 50 inches—strong brown clay loam
50 to 62 inches—strong brown cobbly clay loam
62 to 70 inches—strong brown clay loam

Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: High

Contrasting Inclusions

• Fault escarpments; on shoulders
• Rock outcrop; on shoulders
• Soils that are less than 60 inches deep to bedrock; on foot slopes

Use and Management

Land use: Timber production

Woodland vegetation on Jimmerson stony loam

Main tree species: Douglas-fir, ponderosa pine, sugar pine, white fir, incense cedar
Mean site index for stated species: Douglas-fir—112; ponderosa pine—95
Dunning site class: 2
CACTOS site index: 73
Common understory plants: Greenleaf manzanita, squawcarpet, antelope bitterbrush, gooseberry, snowbrush ceanothus, Idaho fescue, skunkbush sumac, deerbrush

Woodland vegetation on Jimmerson loam

Main tree species: Douglas-fir, ponderosa pine, sugar pine, white fir, incense cedar
Mean site index for stated species: Douglas-fir—106; ponderosa pine—93
Dunning site class: 2
CACTOS site index: 73
Common understory plants: Greenleaf manzanita, bitter cherry, deerbrush, serviceberry, squawcarpet, skunkbush sumac, snowbrush ceanothus

Timber production

Major management factors: Slope, water erosion, compaction hazard, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• The slope limits the kinds of equipment that can be used in forest management.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include sugar pine, ponderosa pine, and Douglas-fir.

Interpretive Groups

Land capability classification: Jimmerson stony loam—VIe, nonirrigated; Jimmerson loam—VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Jimmerson stony loam—7R; Jimmerson loam—6R

210—Karcal-Cuppy complex, 2 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 4,400 to 5,400 feet
Slope range: 2 to 15 percent
Vegetation: Grasses and sagebrush
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Karcal and similar soils: 75 percent
Cuppy and similar soils: 20 percent

Contrasting inclusions: 5 percent

Characteristics of the Karcal Soil

Position on the landscape: Toe slopes
Important surface feature: About 5 to 10 percent of the surface is covered with cobbles and stones.
Parent material: Alluvium from basalt and tuff
Slope: 2 to 9 percent
Typical profile:
0 to 15 inches—brown cobbly silty clay
15 to 29 inches—brown silty clay
29 inches—tuff
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: High
Surface runoff: Slow or medium
Depth to bedrock: 20 to 30 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Cuppy Soil

Position on the landscape: Foot slopes
Important surface feature: About 5 to 10 percent of the surface is covered with cobbles and stones.
Parent material: Alluvium from basalt and tuff
Slope: 5 to 15 percent
Typical profile:
0 to 2 inches—dark brown cobbly clay
2 to 18 inches—dark grayish brown clay
18 to 29 inches—brown clay
29 to 31 inches—hardpan
31 inches—hard basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: High
Surface runoff: Slow or medium
Depth to hardpan: 20 to 38 inches
Depth to bedrock: 21 to 40 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Jellycamp soils, which are less than 20 inches deep to a hardpan over hard bedrock and have more than 35 percent clay in the subsoil; on toe slopes
• Longcreek soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent clay and rock fragments in the subsoil; on escarpments
• Extremely stony rubble land; on escarpments

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants on the Karcal soil: Low sagebrush, bottlebrush squirreltail, bluebunch wheatgrass
Common plants on the Cuppy soil: Mountain big sagebrush, rubber rabbitbrush, mountain brome, bluebunch wheatgrass, bottlebrush squirreltail, Lemmon needlegrass
Major management factors: Shrink-swell
Management considerations:
• If seeding is desired, species that are adapted to a high shrink-swell potential should be selected.

Interpretive Groups

Land capability classification: Karcal—VIs, nonirrigated; Cuppy—IVe, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Karcal—Shallow Cobbly Clay, MAP 14-16 (21e); Cuppy—Cobbly Clay, MAP 14-16 (21e)

211—Keddie muck, 0 to 1 percent slopes

Setting

Landform: Basins
Elevation: 3,100 to 3,200 feet
Slope range: 0 to 1 percent
Vegetation: Rushes, sedges, and grasses
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 50 to 80 days

Composition

Keddie and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Keddie Soil

Parent material: Alluvium from basic igneous rock and lake deposits
Typical profile:
0 to 4 inches—black muck
4 to 42 inches—very dark grayish brown and dark yellowish brown loam
42 to 60 inches—dark yellowish brown and very gravelly sandy clay loam
Depth class: Very deep
Drainage class: Poorly drained
Slowest permeability class: Moderate
Available water capacity: High

Highest shrink-swell potential: Low
Surface runoff: Very slow
Depth to bedrock: More than 60 inches
Frequency of flooding: Occasional for brief periods from December through May
Water table: At the surface to 18 inches below the surface from January through May; at a depth of 18 to 36 inches from June through December
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Pitvar soils, which are 40 to 60 inches deep to a hardpan and have more than 35 percent clay throughout; near stream channels
• Riverwash; in stream channels
• Swanberger soils, which are more than 60 inches deep; near stream channels

Use and Management

Land use: Hay, pasture, or wetland wildlife habitat

Hay and pasture

Major management factors: Soil blowing, flooding, high water table
Management considerations:
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.
• Livestock operations can be impaired by flooding in winter and spring.
• Flooding and the high water table should be considered when stand renovation or reestablishment is planned.
• The high water table saturates the soil in winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
• Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Wetland wildlife habitat

Management considerations:
• This unit can provide important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
• Drainage of wetlands in areas of this unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: IVw-2, irrigated, and VIw-2, nonirrigated
MLRA: 22
Prime farmland: Considered prime farmland in drained areas that are protected from flooding

212—Keddie loam, 0 to 2 percent slopes

Setting

Landform: Flood plains
Elevation: 3,100 to 3,200 feet
Slope range: 0 to 2 percent
Vegetation: Rushes, sedges, and grasses
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 50 to 80 days

Composition

Keddie and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Keddie Soil

Parent material: Alluvium from basic igneous rock and lake deposits
Typical profile:
0 to 21 inches—very dark grayish brown loam
21 to 47 inches—dark brown clay loam
47 to 60 inches—dark yellowish brown gravelly sandy loam
Depth class: Very deep
Drainage class: Poorly drained
Slowest permeability class: Moderate
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Frequency of flooding: Rare for brief periods from December through May
Depth to the water table: 18 to 60 inches from January through March; 42 to 60 inches from April through May; more than 60 inches from June through December
Kind of water table: Apparent
Hazard of water erosion in bare areas: None or low

Contrasting Inclusions

• Pitvar soils, which are 40 to 60 inches deep to a hardpan; on the lower toe slopes
• Riverwash; in stream channels

Use and Management

Land use: Hay, pasture, or wetland wildlife habitat

Hay and pasture

Major management factors: High water table
Management considerations:
• The high water table saturates the soil in winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
• The high water table limits the choice of plant species that can be used for seeding. Frequency, intensity, and duration of grazing affect the composition of the plant community.
• Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Wetland wildlife habitat

Management considerations:
• This unit can provide important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
• Drainage of wetlands in areas of this unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: IIIw-2, irrigated and nonirrigated
MLRA: 22
Prime farmland: Considered prime farmland in drained areas that are protected from flooding

213—Keddie silt loam, 0 to 2 percent slopes

Setting

Landform: Flood plains
Elevation: 3,100 to 3,200 feet
Slope range: 0 to 2 percent
Vegetation: Rushes, sedges, and grasses
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 50 to 80 days

Composition

Keddie and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Keddie Soil

Parent material: Alluvium from basic igneous rock and lake deposits
Typical profile:
0 to 9 inches—very dark grayish brown silt loam
9 to 60 inches—very dark grayish brown silty clay loam and clay loam
Depth class: Very deep
Drainage class: Poorly drained
Slowest permeability class: Moderately slow
Available water capacity: Very high
Highest shrink-swell potential: Moderate
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Frequency of flooding: Occasional for brief periods from December through April
Depth to the water table: 18 to 42 inches from January through May; 42 to 60 inches from June through December
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Jadpor soils, which have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on foot slopes
• Pitvar soils, which are 40 to 60 inches deep to a hardpan and have more than 35 percent clay throughout; near stream channels
• Riverwash; in stream channels

Use and Management

Land use: Irrigated crops, pasture, wetland wildlife habitat, or homesite development

Irrigated crops

Common crops: Grass-legume hay
Major management factors: Flooding, high water table, surface crusting, slow permeability
Management considerations:
• The hazard of flooding should be considered before any cropping is done or capital improvements are installed.
• The high water table can damage deep-rooted crops.
• Careful management of irrigation is needed to avoid raising the water table.
• Surface crusting can greatly reduce the water infiltration rate and hinder seedling emergence. Crusting can be minimized by returning crop residue to the soil and using frequent, light applications of irrigation water.

• Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.

Pasture

Major management factors: Flooding, high water table, surface crusting
Management considerations:
• Livestock operations can be impaired by flooding in winter and spring.
• Flooding and the high water table should be considered when stand renovation or reestablishment is planned. If seeding is desired, species that are adapted to a high water table should be considered.
• The high water table saturates the soil in winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
• Surface crusting can greatly reduce the water infiltration rate and hinder seedling emergence. Livestock can be used to break crusts. Maintaining a cover of vegetation minimizes surface crusting.
• Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Wetland wildlife habitat

Management considerations:
• This unit can provide important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
• Drainage of wetlands in areas of this unit may be prohibited by local, State, or Federal law.

Homesite development

Major management factors: Flooding, wetness, restricted permeability
Management considerations:
• Flooding can occur during winter and early spring. The foundation should be taller than normal, or the buildings should be constructed at the highest elevations. Water should be intercepted by drainage ditches, or a drainage system should be developed around the foundation.
• Flooding can add water to the septic system. Diversion of floodwater helps to overcome this limitation.
• The high water table limits the absorption capacity of the leach field. A mounded leach field or other specialized leach field can help to overcome this limitation.
• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: IIIw-3, irrigated and nonirrigated
MLRA: 22
Prime farmland: Considered prime farmland in drained areas that are protected from flooding

214—Kephart-Quaking complex, 2 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 4,400 to 4,750 feet
Slope range: 2 to 15 percent
Vegetation: Ponderosa pine (fig. 8), antelope bitterbrush, and grasses
Mean annual precipitation: 16 to 25 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Kephart and similar soils: 60 percent
Quaking and similar soils: 30 percent
Contrasting inclusions: 10 percent

Characteristics of the Kephart Soil

Position on the landscape: Foot slopes
Parent material: Tephra over basaltic lava
Typical profile:
3 inches to 0—duff
0 to 3 inches—dark grayish brown, pumiceous very gravelly loamy coarse sand
3 to 8 inches—light brownish gray extremely gravelly coarse sand
8 to 19 inches—brown coarse sandy loam
19 to 25 inches—brown sandy loam
25 to 68 inches—yellowish brown and light yellowish brown sandy clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Low

Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Quaking Soil

Position on the landscape: Foot slopes
Parent material: Tephra deposited over basaltic lava flows
Typical profile:
3 inches to 0—duff
0 to 3 inches—gray, pumiceous very gravelly loamy coarse sand
3 to 7 inches—white, pumiceous extremely gravelly sand
7 to 14 inches—light brown gravelly coarse sandy loam
14 to 21 inches—light brown very gravelly sandy loam
21 to 32 inches—light yellowish brown extremely gravelly sandy clay loam
32 to 64 inches—light yellowish brown extremely gravelly coarse sandy loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Fleener soils, which have more than 35 percent rock fragments and less than 35 percent clay in the subsoil but have a light colored surface layer; on toe slopes
• Jahjo soils, which are less than 14 inches deep to hard bedrock; on toe slopes between lava flow outcrops
• Lava flow outcrops
• Loveness soils, which have less than 35 percent clay in the subsoil but have a light colored surface layer; on toe slopes
• Medici soils, which have medial over loamy-skeletal material; on toe slopes between lava flow outcrops
• Medlake soils, which have pumiceous over medial material; on toe slopes between lava flow outcrops

Use and Management

Land use: Timber production

Woodland vegetation on the Kephart soil

Main tree species: Ponderosa pine, incense cedar
Mean site index for stated species: Ponderosa pine—91
Dunning site class: 3
CACTOS site index: 64
Common understory plants: Greenleaf manzanita, antelope bitterbrush, squirreltail, bloomer goldenbush, needlegrass

Woodland vegetation on the Quaking soil

Main tree species: Jeffrey pine, ponderosa pine, incense cedar
Mean site index for stated species: Jeffrey pine and ponderosa pine—89
Dunning site class: 3
CACTOS site index: 63
Common understory plants: Greenleaf manzanita, bloomer goldenbush, antelope bitterbrush, squirreltail, needlegrass

Timber production

Major management factors: Kephart—pumiceous material, compaction hazard, plant competition, hazard of fire damage; Quaking—pumiceous material, coarse texture, compaction hazard, limited available water capacity, plant competition, hazard of fire damage
Management considerations:
• The extremely porous nature of the pumiceous material allows maximum root development for seedlings and tree growth.
• Water bars constructed with pumice can wash out during periods of intense thunderstorms. Water bars should be constructed with mineral soil material, or roads should be built with rolled grades for erosion control.
• The coarse texture throughout the profile hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A

balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include ponderosa pine.

Interpretive Groups

Land capability classification: Kephart—IVs-4, nonirrigated; Quaking—IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Kephart—6F; Quaking—6S

215—Kettlebelly gravelly loam, 5 to 15 percent slopes

Setting

Landform: Mountains
Elevation: 2,700 to 3,500 feet
Slope range: 5 to 15 percent
Vegetation: Mixed conifers, oaks, and shrubs
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 100 to 140 days

Composition

Kettlebelly and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Kettlebelly Soil

Parent material: Slope alluvium from metasediments
Typical profile:
1 inch to 0—duff
0 to 10 inches—light brown and reddish yellow gravelly loam
10 to 67 inches—reddish yellow silty clay loam and light red silty clay
67 to 99 inches—reddish yellow and pink silty clay loam and silt loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Kindig soils, which are 40 to 60 inches deep to weathered bedrock and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on back slopes
• Neuns soils, which are 20 to 40 inches deep to hard bedrock; on back slopes
• Soils that have more than 35 percent rock fragments in the profile; on back slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, California black oak, sugar pine, incense cedar, Douglas-fir, ponderosa pine
Mean site index for stated species: Douglas-fir—106; ponderosa pine—118
Dunning site class: 2
CACTOS site index: 75
Common understory plants: Deerbrush, squawcarpet, tanoak, brackenfern, California hazel, Pacific dogwood

Timber production

Major management factors: Water erosion, low strength, compaction hazard, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• This soil has low strength, and roads are slick when wet.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include ponderosa pine and Douglas-fir.

Interpretive Groups

Land capability classification: IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 6A

216—Kettlebelly, dry-Neuns complex, 15 to 30 percent slopes

Setting

Landform: Mountains
Elevation: 2,500 to 3,800 feet
Slope range: 15 to 30 percent
Vegetation: Mixed conifers, oaks, and shrubs
Mean annual precipitation: 50 to 60 inches
Mean annual air temperature: 45 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 100 to 140 days

Composition

Kettlebelly and similar soils: 45 percent
Neuns and similar soils: 30 percent
Contrasting inclusions: 25 percent

Characteristics of the Kettlebelly Soil

Position on the landscape: Foot slopes
Parent material: Slope alluvium from metasedimentary rock
Typical profile:
3 inches to 0—duff
0 to 4 inches—brown gravelly loam
4 to 22 inches—light yellowish brown gravelly loam
22 to 30 inches—light yellowish brown gravelly clay loam
30 to 99 inches—very pale brown silty clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate or high

Characteristics of the Neuns Soil

Position on the landscape: Back slopes
Parent material: Slope alluvium from metasedimentary rock
Typical profile:
3 inches to 0—duff
0 to 3 inches—dark grayish brown gravelly sandy loam
3 to 32 inches—yellowish brown very gravelly sandy loam and light yellowish brown very gravelly loam
32 inches—metasedimentary rock
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

- Kindig soils, which are 40 to 60 inches deep to weathered bedrock; on back slopes
- Ponto soils, which are more than 60 inches deep; on toe slopes
- Soils that are less than 60 inches deep to hard bedrock; on back slopes
- Soils that have more than 35 percent rock fragments in the profile; on back slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Kettlebelly soil

Main tree species: Incense cedar, ponderosa pine, Douglas-fir, California black oak
Mean site index for stated species: Ponderosa pine—108
Dunning site class: 2
CACTOS site index: 75
Common understory plants: Tanoak, deerbrush, sticky whiteleaf manzanita, buckbrush, blue wildrye

Woodland vegetation on the Neuns soil

Main tree species: Sugar pine, ponderosa pine, Douglas-fir, California black oak
Mean site index for stated species: Ponderosa pine—103; Douglas-fir—100
Dunning site class: 3
CACTOS site index: 59
Common understory plants: Sierra chinkapin, whitethorn ceanothus, deerbrush, squawcarpet, Pacific dogwood, snowberry, greenleaf manzanita

Timber production

Major management factors: Kettlebelly—water erosion, compaction hazard, plant competition; Neuns—water erosion, depth to rock, rock fragments, limited available water capacity, plant competition

Management considerations:

- Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- Roads and landings can be protected from erosion by constructing water bars.
- Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
- The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
- Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
- Depth to rock and rock fragments in the profile hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
- The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
- Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
- Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
- Trees suitable for planting include ponderosa pine and Douglas-fir.

Interpretive Groups

Land capability classification: Kettlebelly and Neuns—IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Kettlebelly—8A; Neuns—8F

217—Kettlebelly, dry-Neuns complex, 30 to 50 percent slopes

Setting

Landform: Mountains
Elevation: 2,500 to 3,800 feet
Slope range: 30 to 50 percent
Vegetation: Mixed conifers, oaks, and shrubs
Mean annual precipitation: 50 to 60 inches
Mean annual air temperature: 45 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 100 to 140 days

Composition

Kettlebelly and similar soils: 40 percent
Neuns and similar soils: 35 percent
Contrasting inclusions: 25 percent

Characteristics of the Kettlebelly Soil

Position on the landscape: Back slopes
Parent material: Slope alluvium from metasedimentary rock
Typical profile:
3 inches to 0—duff
0 to 4 inches—brown gravelly loam
4 to 22 inches—light yellowish brown gravelly loam
22 to 30 inches—light yellowish brown gravelly clay loam
30 to 99 inches—very pale brown silty clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: High

Characteristics of the Neuns Soil

Position on the landscape: Side slopes
rent material: Slope alluvium from metasedimentary rock
Typical profile:
3 inches to 0—duff
0 to 3 inches—dark grayish brown gravelly sandy loam
3 to 32 inches—yellowish brown very gravelly sandy loam and light yellowish brown very gravelly loam
32 inches—metasedimentary rock
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: High

Contrasting Inclusions

- Kindig soils, which are 40 to 60 inches deep to weathered bedrock; on shoulders
- Soils that are similar to the Kettlebelly soil but are less than 60 inches deep to hard bedrock; on back slopes
- Soils that are similar to the Kettlebelly soil but have more than 35 percent rock fragments in the profile; on back slopes

Use and Management

Land use: Timber production or homesite development

Woodland vegetation on the Kettlebelly soil

Main tree species: Incense cedar, ponderosa pine, Douglas-fir, California black oak
Mean site index for stated species: Ponderosa pine—108
Dunning site class: 2
CACTOS site index: 75
Common understory plants: Deerbrush, tanoak, sticky whiteleaf manzanita, buckbrush, blue wildrye

Woodland vegetation on the Neuns soil

Main tree species: Sugar pine, ponderosa pine, Douglas-fir, California black oak
Mean site index for stated species: Ponderosa pine—103; Douglas-fir—100
Dunning site class: 3
CACTOS site index: 59
Common understory plants: Sierra chinkapin, whitethorn ceanothus, deerbrush, squawcarpet, Pacific dogwood, snowberry

Timber production

Major management factors: Kettlebelly—water erosion, slope, compaction hazard, plant competition; Neuns—water erosion, slope, depth to rock, rock fragments, limited available water capacity, plant competition, hazard of fire damage
Management considerations:
- Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
- The slope limits the kinds of equipment that can be used in forest management.
- The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
- Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
- The rock fragments in the profile hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
- The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
- Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
- Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
- Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
- Trees suitable for planting include ponderosa pine and Douglas-fir.

Homesite development

Major management factors: Kettlebelly—water erosion, slope, restricted permeability; Neuns—water erosion, slope, depth to rock
Management considerations:
- Maintaining a permanent ground cover on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- During construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.
- If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.
- The limited depth to rock inhibits the filtering capacity of the leach fields or can prevent their placement. If the leach lines are placed too close to the bedrock, ground water may be contaminated by the effluent.

• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Kettlebelly and Neuns—VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Kettlebelly and Neuns—8R

218—Kettlebelly-Neuns complex, 15 to 30 percent slopes

Setting

Landform: Mountains
Elevation: 2,700 to 3,500 feet
Slope range: 15 to 30 percent
Vegetation: Mixed conifers, oaks, and shrubs
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Kettlebelly and similar soils: 55 percent
Neuns and similar soils: 25 percent
Contrasting inclusions: 20 percent

Characteristics of the Kettlebelly Soil

Position on the landscape: Toe slopes
Parent material: Slope alluvium from metasedimentary rock
Typical profile:
1 inch to 0—duff
0 to 10 inches—light brown and reddish yellow gravelly loam
10 to 67 inches—reddish yellow silty clay loam and light red silty clay
67 to 99 inches—reddish yellow silty clay loam and pink silt loam
99 inches—metasedimentary rock
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Neuns Soil

Position on the landscape: Foot slopes
Parent material: Slope alluvium from metasedimentary rock
Slope: 15 to 30 percent
Typical profile:
3 inches to 0—duff
0 to 7 inches—dark grayish brown and yellowish brown gravelly sandy loam
7 to 32 inches—yellowish brown and light yellowish brown very gravelly sandy loam and very gravelly loam
32 inches—metasedimentary rock
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

• Etsel soils, which are less than 20 inches deep to hard bedrock; on back slopes
• Kindig soils, which are 40 to 60 inches deep to weathered bedrock; on back slopes
• Soils that are similar to the Kettlebelly soil but are less than 60 inches deep to bedrock; on side slopes
• Soils that are similar to the Kettlebelly soil but have more than 35 percent rock fragments in the profile; on side slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Kettlebelly soil

Main tree species: White fir, sugar pine, Douglas-fir, ponderosa pine, incense cedar, California black oak
Mean site index for stated species: Douglas-fir—106; ponderosa pine—118
Dunning site class: 2
CACTOS site index: 75
Common understory plants: Whitethorn ceanothus, deerbrush, squawcarpet, California hazel, Pacific dogwood, tanoak, brackenfern

Woodland vegetation on the Neuns soil

Main tree species: Sugar pine, Douglas-fir, ponderosa pine, California black oak

Mean site index for stated species: Douglas-fir—100; ponderosa pine—103
Dunning site class: 3
CACTOS site index: 59
Common understory plants: Greenleaf manzanita, whitethorn ceanothus, deerbrush, snowberry, Sierra chinkapin, squawcarpet, Pacific dogwood

Timber production

Major management factors: Kettlebelly—water erosion, compaction hazard, plant competition; Neuns—water erosion, depth to rock, rock fragments, limited available water capacity, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
• The rock fragments in the profile hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include ponderosa pine and Douglas-fir.

Interpretive Groups

Land capability classification: Kettlebelly and Neuns—IVe-4, nonirrigated
MLRA: 5
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Kettlebelly—6A; Neuns—8F

219—Kettlebelly-Neuns complex, 30 to 50 percent slopes

Setting

Landform: Mountains
Elevation: 2,700 to 3,500 feet
Slope range: 30 to 50 percent
Vegetation: Mixed conifers, oaks, and shrubs
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Kettlebelly and similar soils: 55 percent
Neuns and similar soils: 30 percent
Contrasting inclusions: 15 percent

Characteristics of the Kettlebelly Soil

Position on the landscape: Back slopes
Parent material: Slope alluvium from metasedimentary rock
Typical profile:
1 inch to 0—duff
0 to 10 inches—light brown and reddish yellow gravelly loam
10 to 67 inches—reddish yellow silty clay loam and silty clay
67 to 99 inches—reddish yellow silty clay loam and pink silt loam
99 inches—metasedimentary rock
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: High

Characteristics of the Neuns Soil

Position on the landscape: Back slopes and shoulders
Parent material: Slope alluvium from metasedimentary rock
Typical profile:
3 inches to 0—duff
0 to 7 inches—dark grayish brown and yellowish brown gravelly sandy loam

7 to 32 inches—yellowish brown very gravelly sandy loam and light yellowish brown very gravelly loam
32 inches—metasedimentary rock
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: High

Contrasting Inclusions

• Etsel soils, which are less than 20 inches deep to hard bedrock; on shoulders
• Kindig soils, which are 40 to 60 inches deep to weathered bedrock; on back slopes
• Soils that are similar to the Kettlebelly soil but are less than 60 inches deep to bedrock; on back slopes and summits
• Soils that are similar to the Kettlebelly soil but have more than 35 percent rock fragments in the profile; on back slopes and summits

Use and Management

Land use: Timber production

Woodland vegetation on the Kettlebelly soil

Main tree species: Douglas-fir, sugar pine, white fir, California black oak, incense cedar, ponderosa pine
Mean site index for stated species: Douglas-fir—106; ponderosa pine—118
Dunning site class: 2
CACTOS site index: 75
Common understory plants: Whitethorn ceanothus, deerbrush, squawcarpet, California hazel, Pacific dogwood, tanoak, brackenfern

Woodland vegetation on the Neuns soil

Main tree species: Sugar pine, Douglas-fir, California black oak, ponderosa pine
Mean site index for stated species: Douglas-fir—100; ponderosa pine—103
Dunning site class: 3
CACTOS site index: 59
Common understory plants: Greenleaf manzanita, Sierra chinkapin, whitethorn ceanothus, deerbrush, squawcarpet, Pacific dogwood, snowberry

Timber production

Major management factors: Kettlebelly—water erosion, slope, compaction hazard, plant competition; Neuns—water erosion, slope, depth to rock, rock fragments, limited available water capacity, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• The slope limits the kinds of equipment that can be used in forest management.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
• The rock fragments in the profile hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include ponderosa pine and Douglas-fir.

Interpretive Groups

Land capability classification: Kettlebelly and Neuns—VIe, nonirrigated
MLRA: 5
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Kettlebelly—6R; Neuns—8R

220—Kilarc gravelly silt loam, 2 to 15 percent slopes

Setting

Landform: Mountains
Elevation: 1,000 to 2,400 feet
Slope range: 2 to 15 percent
Vegetation: Oak, Digger pine, and shrubs
Mean annual precipitation: 50 to 60 inches
Mean annual air temperature: 52 to 54 degrees F
Mean annual soil temperature: 54 to 56 degrees F
Frost-free period: 150 to 160 days

Composition

Kilarc and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Kilarc Soil

Parent material: Slope alluvium from weakly consolidated sandstone
Typical profile:
0 to 7 inches—grayish brown gravelly silt loam
7 to 24 inches—light brownish gray clay
24 to 50 inches—pale brown gravelly sandy clay
50 inches—weakly consolidated sandstone
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: High
Highest shrink-swell potential: High
Surface runoff: Slow or medium
Depth to claypan: 10 to 15 inches
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Kettlebelly soils, which are more than 60 inches deep; on toe slopes
• Soils that are less than 40 inches deep; on back slopes and shoulders

Use and Management

Land use: Wood products

Woodland vegetation

Main woodland species: Interior live oak, Oregon white oak, incense cedar, California black oak, Digger pine, blue oak
Common understory plants: Squirreltail, poison oak, whiteleaf manzanita, needlegrass
Major management factors: Water erosion, compaction hazard, depth to the claypan, fine textured subsoil, limited available water capacity, low pH, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and trails can be protected from erosion by constructing water bars.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The claypan prevents water from moving rapidly through the profile. Wheeled equipment should not be used when the soil is saturated.
• The high content of clay in the subsoil can reduce trafficability during wet periods. Roads should be graveled or surfaced for all-weather use.
• The exposed subsoil hinders root penetration and elongation and thus results in poor plant growth. Special site preparation, such as ripping, is necessary for successful regeneration.
• In summer, high soil temperatures and low soil moisture content can cause a high seedling mortality rate, especially on south- and southwest-facing slopes.
• Low pH in the profile hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Plants that are tolerant of this condition should be considered when these areas are revegetated, or the nutrient imbalance can be corrected chemically.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.

Interpretive Groups

Land capability classification: IIIe-3, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 1D

221—Kilarc gravelly silt loam, 15 to 30 percent slopes

Setting

Landform: Mountains
Elevation: 1,000 to 2,400 feet
Slope range: 15 to 30 percent

Vegetation: Oak, Digger pine, and shrubs
Mean annual precipitation: 50 to 60 inches
Mean annual air temperature: 52 to 54 degrees F
Mean annual soil temperature: 54 to 56 degrees F
Frost-free period: 150 to 160 days

Composition

Kilarc and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Kilarc Soil

Parent material: Slope alluvium from weakly consolidated sandstone
Typical profile:
0 to 7 inches—grayish brown gravelly silt loam
7 to 24 inches—light brownish gray clay
24 to 50 inches—pale brown gravelly sandy clay
50 inches—weakly consolidated sandstone
Depth class: Deep
Drainage class: Moderately well drained
Slowest permeability class: Slow
Available water capacity: High
Highest shrink-swell potential: High
Surface runoff: Rapid
Depth to claypan: 10 to 15 inches
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Moderate or high

Contrasting Inclusions

• Kettlebelly soils, which are more than 60 inches deep; on foot slopes
• Soils that are less than 40 inches deep; on back slopes and shoulders

Use and Management

Land use: Wood products

Woodland vegetation

Main woodland species: Oregon white oak, interior live oak, Digger pine, blue oak, incense cedar
Common understory plants: Squirreltail, poison oak, whiteleaf manzanita, needlegrass
Major management factors: Water erosion, compaction hazard, depth to the claypan, fine textured subsoil, limited available water capacity, low pH, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The claypan prevents water from moving rapidly through the profile. Wheeled equipment should not be used when the soil is saturated
• The high content of clay in the subsoil can reduce trafficability during wet periods. Roads should be graveled or surfaced for all-weather use.
• The exposed subsoil hinders root penetration and elongation and thus results in poor plant growth. Special site preparation, such as ripping, is necessary for successful regeneration.
• In summer, high soil temperatures and low soil moisture content can cause a high seedling mortality rate, especially on south- and southwest-facing slopes.
• Low pH in the profile hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Plants that are tolerant of this condition should be considered when these areas are revegetated, or the nutrient imbalance can be corrected chemically.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.

Interpretive Groups

Land capability classification: IVe-3, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 1D

222—Kilarc gravelly silt loam, 30 to 50 percent slopes

Setting

Landform: Mountains
Elevation: 1,000 to 2,400 feet
Slope range: 30 to 50 percent
Vegetation: Oak, Digger pine, and shrubs
Mean annual precipitation: 50 to 60 inches
Mean annual air temperature: 52 to 54 degrees F
Mean annual soil temperature: 54 to 56 degrees F
Frost-free period: 150 to 160 days

Composition

Kilarc and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Kilarc Soil

Parent material: Slope alluvium from weakly consolidated sandstone
Typical profile:
0 to 7 inches—grayish brown gravelly silt loam
7 to 24 inches—light brownish gray clay
24 to 50 inches—pale brown gravelly sandy clay
50 inches—weakly consolidated sandstone
Depth class: Deep
Drainage class: Moderately well drained
Slowest permeability class: Slow
Available water capacity: High
Highest shrink-swell potential: High
Surface runoff: Rapid
Depth to claypan: 10 to 15 inches
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: High

Contrasting Inclusions

• Kettlebelly soils, which are more than 60 inches deep; on back slopes
• Rock outcrop; on shoulders
• Soils that are less than 40 inches deep; on shoulders

Use and Management

Land use: Wood products

Woodland vegetation

Main woodland species: Incense cedar, Oregon white oak, Digger pine, interior live oak, blue oak
Common understory plants: Squirreltail, poison oak, whiteleaf manzanita, needlegrass
Major management factors: Water erosion, compaction hazard, depth to the claypan, fine textured subsoil, limited available water capacity, low pH, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and trails can be protected from erosion by constructing water bars.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The claypan prevents water from moving rapidly through the profile. Wheeled equipment should not be used when the soil is saturated.
• The high content of clay in the subsoil can reduce trafficability during wet periods. Roads should be graveled or surfaced for all-weather use.
• The exposed subsoil hinders root penetration and elongation and thus results in poor plant growth. Special site preparation, such as ripping, is necessary for successful regeneration.
• In summer, high soil temperatures and low soil moisture content can cause a high seedling mortality rate, especially on south- and southwest-facing slopes.
• Low pH in the profile hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Plants that are tolerant of this condition should be considered when these areas are revegetated, or the nutrient imbalance can be corrected chemically.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.

Woodland grazing

Major management factors: Slope, water erosion
Management considerations:
• The slope may limit access by equipment and some kinds of livestock. Fencing, water development, and forage supplements can improve livestock distribution.
• If seeding is desired, broadcast methods should be considered.
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.

Interpretive Groups

Land capability classification: VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 1D

223—Kindig-Neuns complex, 15 to 30 percent slopes

Setting

Landform: Mountains
Elevation: 2,500 to 5,000 feet
Slope range: 15 to 30 percent
Vegetation: Mixed conifers, oaks, and shrubs
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 45 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Kindig and similar soils: 50 percent
Neuns and similar soils: 30 percent
Contrasting inclusions: 20 percent

Characteristics of the Kindig Soil

Position on the landscape: Back slopes
Parent material: Slope alluvium from metasedimentary rock
Typical profile:
1 inch to 0—duff
0 to 2 inches—very dark grayish brown gravelly sandy loam
2 to 8 inches—light brown gravelly sandy loam
8 to 14 inches—light brown very gravelly sandy loam
14 to 49 inches—light brown very cobbly loam
49 inches—weathered shale
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Moderate

Characteristics of the Neuns Soil

Position on the landscape: Back slopes
Parent material: Slope alluvium from metasedimentary rock
Typical profile:
3 inches to 0—duff
0 to 3 inches—dark grayish brown gravelly sandy loam
3 to 32 inches—yellowish brown very gravelly sandy loam and light yellowish brown very gravelly loam
32 inches—metasedimentary rock
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

• Ponto soils, which are more than 60 inches deep and have less than 35 percent rock fragments in the profile; on toe slopes
• Stoner soils, which are more than 60 inches deep and have less than 35 percent rock fragments in the profile; on toe slopes
• Wyntoon soils, which are more than 60 inches deep and have an argillic horizon; on toe slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Kindig soil

Main tree species: White fir, sugar pine, ponderosa pine, Douglas-fir, incense cedar, California black oak
Mean site index for stated species: White fir—52; ponderosa pine—89; Douglas-fir—110
Dunning site class: 2
CACTOS site index: 67
Common understory plants: Greenleaf manzanita, Sierra chinkapin, whitethorn ceanothus, deerbrush, sulfurflower, fescue

Woodland vegetation on the Neuns soil

Main tree species: White fir, ponderosa pine, sugar pine, California black oak, Douglas-fir
Mean site index for stated species: Ponderosa pine—103; Douglas-fir—100
Dunning site class: 3
CACTOS site index: 59
Common understory plants: Greenleaf manzanita, Sierra chinkapin, whitethorn ceanothus, deerbrush, squawcarpet, Pacific dogwood, snowberry

Timber production

Major management factors: Kindig—water erosion, rock fragments, compaction hazard, limited available water capacity, plant competition; Neuns—water erosion, depth to rock, rock fragments, compaction hazard, limited available water capacity, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
• The depth to rock and rock fragments in the profile hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction

reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir, sugar pine, ponderosa pine, and Douglas-fir.

Interpretive Groups

Land capability classification: Kindig and Neuns—IVe-4, nonirrigated
MLRA: 5
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Kindig—7F; Neuns—8F

224—Kindig-Neuns complex, 30 to 50 percent slopes

Setting

Landform: Mountains
Elevation: 2,500 to 5,000 feet
Slope range: 30 to 50 percent
Vegetation: Mixed conifers, oaks, and shrubs
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 45 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Kindig and similar soils: 45 percent
Neuns and similar soils: 35 percent
Contrasting inclusions: 20 percent

Characteristics of the Kindig Soil

Position on the landscape: Back slopes
Parent material: Slope alluvium from metasedimentary rock
Typical profile:
3 inches to 0—duff
0 to 2 inches—very dark grayish brown gravelly sandy loam
2 to 8 inches—light brown gravelly sandy loam
8 to 14 inches—light brown very gravelly sandy loam
14 to 49 inches—light brown very cobbly loam
49 inches—weathered shale
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Moderate or high

Characteristics of the Neuns Soil

Position on the landscape: Back slopes
Parent material: Slope alluvium from metasedimentary rock
Typical profile:
3 inches to 0—duff
0 to 3 inches—dark grayish brown gravelly sandy loam
3 to 32 inches—yellowish brown and light yellowish brown very gravelly sandy loam and very gravelly loam
32 inches—metasedimentary rock
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: High

Contrasting Inclusions

• Kettlebelly soils, which are more than 60 inches deep, have an argillic horizon, and have less than 35 percent rock fragments in the profile; on foot slopes
• Neer soils, which are 20 to 40 inches deep to weathered bedrock; on side slopes
• Soils that are similar to the Kindig soil but have less than 35 percent rock fragments in the profile; on foot slopes

Use and Management

Land use: Timber production or homesite development

Woodland vegetation on the Kindig soil

Main tree species: Incense cedar, white fir, ponderosa pine, Douglas-fir, California black oak, sugar pine
Mean site index for stated species: White fir—52; ponderosa pine—89; Douglas-fir—110

Dunning site class: 2
CACTOS site index: 67
Common understory plants: Manzanita, Sierra chinkapin, whitethorn ceanothus, deerbrush, sulfurflower, fescue

Woodland vegetation on the Neuns soil

Main tree species: Sugar pine, ponderosa pine, Douglas-fir, white fir, California black oak
Mean site index for stated species: Ponderosa pine—103; Douglas-fir—100
Dunning site class: 3
CACTOS site index: 59
Common understory plants: Sierra chinkapin, whitethorn ceanothus, deerbrush, squawcarpet, Pacific dogwood, snowberry, greenleaf manzanita

Timber production

Major management factors: Kindig—water erosion, slope, rock fragments, compaction hazard, limited available water capacity, plant competition, hazard of fire damage; Neuns—water erosion, slope, depth to rock, rock fragments, compaction hazard, limited available water capacity, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• The slope limits the kinds of equipment that can be used in forest management.
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
• The depth to rock and the rock fragments in the profile hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir, sugar pine, ponderosa pine, and Douglas-fir.

Homesite development

Major management factors: Kindig—water erosion, slope; Neuns—water erosion, slope, depth to rock
Management considerations:
• Maintaining a permanent ground cover on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• During construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.
• If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.
• The limited depth to rock inhibits the filtering capacity of the leach fields or can prevent their placement. If the leach lines are placed too close to the bedrock, ground water may be contaminated by the effluent.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Kindig and Neuns—VIe, nonirrigated
MLRA: 5
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Kindig—7R; Neuns—8R

225—Lassen-Cuppy complex, 2 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 4,400 to 5,400 feet
Slope range: 2 to 15 percent
Vegetation: Grasses and sagebrush (fig. 9)
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 45 to 50 degrees F
Mean annual soil temperature: 48 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Lassen and similar soils: 45 percent
Cuppy and similar soils: 35 percent
Contrasting inclusions: 20 percent

Characteristics of the Lassen Soil

Position on the landscape: Toe slopes
Important surface feature: About 5 to 10 percent of the surface is covered with cobbles and stones.
Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 2 inches—dark brown cobbly clay
2 to 28 inches—dark grayish brown and dark brown clay
28 inches—hard basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: High
Surface runoff: Slow or medium
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Cuppy Soil

Position on the landscape: Toe slopes
Important surface feature: About 5 to 10 percent of the surface is covered with cobbles and stones.
Parent material: Alluvium from basalt and tuff
Typical profile:
0 to 2 inches—dark brown cobbly clay
2 to 18 inches—dark grayish brown clay
18 to 29 inches—dark brown clay and strong brown clay loam
29 to 31 inches—hardpan
31 inches—hard basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: High
Surface runoff: Slow or medium
Depth to hardpan: 20 to 38 inches
Depth to bedrock: 21 to 40 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Jellycamp soils, which are less than 20 inches deep to a hardpan over hard bedrock; on mounds
• Lava flow outcrops; on shoulders
• Longcreek soils, which are less than 20 inches deep to hard bedrock; on escarpments

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants: Mountain brome, mountain big sagebrush, rubber rabbitbrush, bluebunch wheatgrass, bottlebrush squirreltail, Lemmon needlegrass
Major management factors: Shrink-swell
Management considerations:
• If seeding is desired, species that are adapted to a high shrink-swell potential should be selected.

Interpretive Groups

Land capability classification: Lassen—IVe-5, nonirrigated; Cuppy—IVe-7, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Lassen and Cuppy—Cobbly Clay, MAP 14-16 (21e)

226—Lasvar clay, 0 to 2 percent slopes

Setting

Landform: Basins
Elevation: 3,100 to 3,200 feet
Slope range: 0 to 2 percent
Vegetation: Rushes, sedges, and grasses
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 50 to 80 days

Composition

Lasvar and similar soils: 90 percent
Contrasting inclusions: 10 percent

Characteristics of the Lasvar Soil

Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 2 inches—mottled, black clay

2 to 30 inches—mottled, dark grayish brown clay
30 to 38 inches—mottled, pale brown silty clay loam
38 inches—hardpan
Depth class: Moderately deep
Drainage class: Somewhat poorly drained
Slowest permeability class: Slow
Available water capacity: Moderate
Highest shrink-swell potential: High
Surface runoff: Ponded
Depth to hardpan: 20 to 40 inches
Depth to bedrock: More than 60 inches
Water table: At a depth of 36 to 72 inches from August through October; at the surface to 36 inches below the surface from December through July
Kind of water table: Perched
Ponding: 6 inches above the surface for long periods from December through April
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Burman soils, which are 20 to 40 inches deep to a hardpan and have an abrupt textural change; on foot slopes
• Nosoni soils, which are more than 60 inches deep and have less than 35 percent clay in the subsoil; on foot slopes
• Patburn soils, which are more than 60 inches deep and have an argillic horizon; on foot slopes
• Pitvar soils, which are 40 to 60 inches deep to a hardpan; on toe slopes

Use and Management

Land use: Hay, pasture, or wetland wildlife habitat

Hay and pasture

Major management factors: High water table, shrink-swell
Management considerations:
• The high water table saturates the soil in winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
• The high water table limits the choice of plant species and increases the likelihood that hydrophytic plants will invade.
• If seeding is desired, species that are adapted to a high water table and a high shrink-swell potential should be selected.
• Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Wetland wildlife habitat

Management considerations:
• This unit can provide important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
• Drainage of wetlands in areas of this unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: IVw-5, irrigated and nonirrigated
MLRA: 22
Prime farmland: Considered prime farmland in drained areas
Range site: Clay Flat, MAP 18+ (22d)

227—Lasvar-Pitvar complex, 0 to 2 percent slopes

Setting

Landform: Basins and drainageways
Elevation: 3,100 to 4,800 feet
Slope range: 0 to 2 percent
Vegetation: Grasses and forbs
Mean annual precipitation: 16 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 50 to 100 days

Composition

Lasvar and similar soils: 55 percent
Pitvar and similar soils: 35 percent
Contrasting inclusions: 10 percent

Characteristics of the Lasvar Soil

Position on the landscape: Foot slopes
Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 3 inches—mottled, grayish brown clay
3 to 28 inches—mottled, brown clay
28 to 31 inches—mottled, very pale brown silt loam
31 to 60 inches—hardpan
Depth class: Moderately deep
Drainage class: Somewhat poorly drained
Slowest permeability class: Slow
Available water capacity: Moderate
Highest shrink-swell potential: High

Surface runoff: Ponded
Depth to hardpan: 20 to 40 inches
Depth to bedrock: More than 60 inches
Water table: At the surface to 36 inches below the surface from December through July; at a depth of 36 to 72 inches from August through October
Kind of water table: Perched
Ponding: 6 inches above the surface for very long periods from December through April
Hazard of water erosion in bare areas: Low

Characteristics of the Pitvar Soil

Position on the landscape: Toe slopes
Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 36 inches—mottled, brown clay
36 to 55 inches—mottled, brown clay and silty clay
55 to 58 inches—hardpan
58 to 72 inches—mottled, light brown clay loam
Depth class: Deep
Drainage class: Somewhat poorly drained
Slowest permeability class: Slow
Available water capacity: Very high
Highest shrink-swell potential: High
Surface runoff: Ponded
Depth to hardpan: 50 to 60 inches
Depth to bedrock: More than 60 inches
Water table: At the surface to 12 inches below the surface from December through April; at a depth of 12 to 36 inches from May through July; at a depth of 36 to 72 inches from August through October
Kind of water table: Perched
Ponding: 12 inches above the surface for long periods from December through April
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Burman soils, which are 20 to 40 inches deep to a hardpan and have more than 35 percent clay in the subsoil; on toe slopes
• Channeled areas
• Soils that have more than 35 percent clay in the subsoil and are light colored; on foot slopes
• Soils that are more than 60 inches deep and have less than 35 percent clay in the subsoil; on toe slopes
• Patburn soils, which are more than 60 inches deep; on foot slopes
• Soils that have 5 to 30 percent cobbles on the surface; in stream channels
• Soils that do not have a hardpan; in stream channels
• Swanberger soils, which are more than 60 inches deep and have clay textures throughout; in stream channels

Use and Management

Land use: Irrigated crops, livestock grazing, or wetland wildlife habitat

Irrigated crops

Common crops: Grass-legume hay and barley
Major management factors: Lasvar—cemented pan, ponding, high water table, slow permeability; Pitvar—ponding, high water table, slow permeability
Management considerations:
• On soils that have a cemented pan, intensive management of irrigation water is needed to prevent the buildup of a perched water table. Ripping or subsoiling can permanently enhance the root environment.
• Soil wetness or ponding can impact crop selections, the tillage period, and equipment use.
• The high water table limits the choice of crops and cultivars and increases the risk of winterkill.
• Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.

Livestock grazing

Common plants: Danthonia, bluegrass, yampa
Major management factors: High water table, shrink-swell
Management considerations:
• The high water table saturates the soil in winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
• The high water table limits the choice of plant species that can be used for seeding. Frequency, intensity, and duration of grazing affect the composition of the plant community.
• If seeding is desired, species that are adapted to a high water table and a high shrink-swell potential should be selected.
• Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Wetland wildlife habitat

Management considerations:
• This unit can provide important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created in areas of

this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
• Drainage of wetlands in areas of this unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: Lasvar—IVw-5, irrigated and nonirrigated; Pitvar—Vw-2, irrigated and nonirrigated
MLRA: 22
Prime farmland: Considered prime farmland in irrigated areas that are drained
Range site: Lasvar and Pitvar—Clay Flat, MAP 18+ (22d)

228—Lava flows

Setting

Landform: Lava plateaus
Elevation: 3,000 to 4,500 feet
Slope range: 2 to 15 percent
Vegetation: Conifers, shrubs, and grasses
Mean annual precipitation: 20 to 40 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 50 to 100 days

Composition

Lava flows: 90 percent
Contrasting inclusions: 10 percent

Characteristics of the Lava Flows

• Lava flows consist of areas covered by geologically recent lava. They are characterized by sharp, jagged, broken blocks piled in tumbled heaps and have many crevices, sinkholes, and collapsed lava tubes. Most areas are vegetated by such plants as western juniper, ponderosa pine, antelope bitterbrush, manzanita, and Modoc cypress, but some areas are virtually devoid of vegetation.

Contrasting Inclusions

• Gassaway soils, which are less than 20 inches deep to hard bedrock; on or near lava flow outcrops
• Jellico soils, which are 20 to 40 inches deep; on or near lava flow outcrops
• Neer soils, which are 20 to 40 inches deep to hard bedrock; on toe slopes
• Soils of varying textures that are 40 to 60 inches deep; on toe slopes

Use and Management

Land use: Wood products or grazing

Wood products

Major management factors: Rock fragments on the surface
Management considerations:
• The rock fragments on the surface can interfere with the harvesting of wood products.
• Lava flows tend to interfere with the felling and collecting of wood products and with other uses of equipment. Harvesting activities should be planned so that traffic is limited in the lava flow areas.
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 10 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.

Woodland grazing

Major management factors: Depth to rock, large stones
Management considerations:
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction in areas of Lava flows requires special design.

Interpretive Groups

Land capability classification: VIII, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland

229—Lava flows-Gassaway complex, 2 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 3,000 to 3,600 feet
Slope range: 2 to 15 percent
Vegetation: Juniper, conifers, oak, and shrubs
Mean annual precipitation: 16 to 25 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Lava flows: 60 percent
Gassaway and similar soils: 30 percent
Contrasting inclusions: 10 percent

Characteristics of the Lava Flows

• Lava flows consist of areas covered by geologically recent lava. They are characterized by sharp, jagged, broken blocks piled in tumbled heaps and have many crevices, sinkholes, and collapsed lava tubes. Most areas are vegetated by such plants as western juniper, ponderosa pine, antelope bitterbrush, manzanita, and Modoc cypress, but some areas are virtually devoid of vegetation.

Characteristics of the Gassaway Soil

Position on the landscape: On lava flow outcrops and in pockets between lava flow outcrops
Important surface feature: About 10 to 20 percent of the surface is covered with cobbles and stones.
Parent material: Eolian deposits from extrusive igneous rock
Typical profile:
0 to 3 inches—brown cobbly loam
3 to 12 inches—brown loam
12 inches—hard basalt
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: 11 to 14 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Bollibokka soils, which are less than 20 inches deep to hard bedrock; on toe slopes between lava flow outcrops
• Pastolla soils, which are more than 60 inches deep; on toe slopes near lakes and streams

Use and Management

Land use: Livestock grazing or wood products

Livestock grazing

Common plants on the Gassaway soil: Mountain big sagebrush, antelope bitterbrush, greenleaf manzanita
Major management factors: Lava flows—depth to rock, rock fragments on the surface; Gassaway—water erosion, frost heaving, depth to rock, limited available water capacity
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 35 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Forage production is limited by the shallow rooting depth and the rock fragments on the surface. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils and in areas of Lava flows requires special design.
• Frost heaving forces bunchgrasses and shrubs above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Woodland vegetation on the Gassaway soil

Main tree species: Western juniper, ponderosa pine, Oregon white oak, Modoc cypress, California black oak
Mean site index for stated species: Ponderosa pine—68
Dunning site class: 4
CACTOS site index: 49
Common understory plants: Greenleaf manzanita, mountain big sagebrush, antelope bitterbrush

Wood products

Major management factors: Lava flows—rock fragments on the surface; Gassaway—rock fragments on the surface, depth to rock, compaction hazard, thin subsoil, limited available water capacity
Management considerations:
• The rock fragments on the surface can interfere with the harvesting of wood products.
• The Lava flows tend to interfere with felling and loading and with other uses of equipment. Harvesting activities should be planned so that vehicular traffic is limited in the areas of Lava flows.
• Because of the shallow depth to rock and the thin subsoil, disturbances of the surface should be kept to a minimum. Site preparation using bulldozers is not advisable in areas of this unit.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The limited available water capacity reduces the

seedling survival rate. In summer, high soil temperatures and low soil moisture content can cause a high seedling mortality rate, especially on south- and southwest-facing slopes.

Interpretive Groups

Land capability classification: Lava flows—VIII, nonirrigated; Gassaway—VIIs, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Gassaway—4F

230—Lava flows-Neer complex, 2 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 3,000 to 4,000 feet
Slope range: 2 to 15 percent
Vegetation: Juniper, conifers, oak, and shrubs
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Lava flows: 60 percent
Neer and similar soils: 20 percent
Contrasting inclusions: 20 percent

Characteristics of the Lava Flows

• Lava flows consist of areas covered by geologically recent lava. They are characterized by sharp, jagged, broken blocks piled in tumbled heaps and have many crevices, sinkholes, and collapsed lava tubes. Most areas are vegetated by such plants as western juniper, ponderosa pine, antelope bitterbrush, manzanita, and Modoc cypress, but some areas are virtually devoid of vegetation.

Characteristics of the Neer Soil

Position on the landscape: On lava flow outcrops and in pockets between lava flow outcrops
Important surface feature: About 30 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Slope alluvium and eolian deposits from extrusive igneous rock
Slope: 5 to 15 percent
Typical profile:
1 inch to 0—duff
0 to 6 inches—brown very cobbly loam
6 to 32 inches—brown and light brown very cobbly loam
32 inches—hard basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Chirpchatter soils, which are more than 60 inches deep and have less than 35 percent clay in the subsoil; on toe slopes
• Gassaway soils, which are less than 20 inches deep to hard bedrock; near lava flow outcrops
• Hunsinger soils, which are 40 to 60 inches deep to weathered bedrock; near lava flow outcrops
• Soils that are 40 to 60 inches deep to hard bedrock; on toe slopes

Use and Management

Land use: Timber production or grazing

Woodland vegetation on the Neer soil

Main tree species: Incense cedar, ponderosa pine
Mean site index for stated species: Ponderosa pine—71
Dunning site class: 4
CACTOS site index: 57
Common understory plants: Greenleaf manzanita, serviceberry, snowbrush ceanothus, bluebunch wheatgrass, needlegrass, Sierra chinkapin

Timber production

Major management factors: Lava flows—depth to rock, rock fragments; Neer—depth to rock, rock fragments, plant competition
Management considerations:
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
• The routing of equipment should be planned before operations are begun.
• The rock fragments on the surface can interfere with felling, yarding, and other activities involving the use of equipment and can limit the choice of mechanized planting equipment.
• The Lava flows tend to interfere with felling and yarding and with other uses of equipment. Harvesting activities should be planned so that vehicular traffic is limited in the areas of Lava flows.
• The rock fragments in the profile hinder planting in

areas where the subsoil is exposed or disturbed. The appropriate tools and techniques should be used.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include ponderosa pine.

Woodland grazing

Major management factors: Lava flows—depth to rock; Neer—rock fragments on the surface, frost heaving
Management considerations:
• Fence construction on shallow soils requires special design.
• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Frost heaving forces bunchgrasses and sagebrush above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.

Interpretive Groups

Land capability classification: Lava flows—VIII, nonirrigated; Neer—VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Neer—4X

231—Longbell gravelly coarse sandy loam, 2 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 4,100 to 5,000 feet
Slope range: 2 to 15 percent
Vegetation: Ponderosa pine, antelope bitterbrush, and grasses (fig. 10)
Mean annual precipitation: 16 to 25 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 49 degrees F
Frost-free period: 80 to 100 days

Composition

Longbell and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Longbell Soil

Parent material: Tephra deposited over volcanic outwash
Typical profile:
2 inches to 0—duff
0 to 3 inches—brown gravelly coarse sandy loam
3 to 30 inches—brown and pale brown gravelly loamy coarse sand
30 to 42 inches—pale brown gravelly loamy sand
42 to 72 inches—very pale brown very gravelly sand
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability class: Moderately rapid over very rapid
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Jahjo soils, which are less than 20 inches deep to hard bedrock; near lava flow outcrops
• Lava flow outcrops; on shoulders
• Soils that have more than 35 percent rock fragments in the profile; near lava flow outcrops

Use and Management

Land use: Timber production

Woodland vegetation on the Longbell soil

Main tree species: Ponderosa pine
Mean site index for stated species: Ponderosa pine—85
Dunning site class: 3
CACTOS site index: 55
Common understory plants: Greenleaf manzanita, needlegrass, antelope bitterbrush, bottlebrush squirreltail, bloomer goldenbush

Timber production

Major management factors: Compaction hazard, limited available water capacity, plant competition
Management considerations:
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• Plant competition delays natural regeneration but

Figure 4.—Typical landscape and vegetation in an area of Dudgen-Graven complex, 0 to 5 percent slopes. The natural vegetation is dominantly low sagebrush, Lemmon needlegrass, and Sandberg bluegrass.

Figure 5.—Typical landscape and vegetation in an area of Esperanza sandy loam, 2 to 5 percent slopes. The natural vegetation is dominantly antelope bitterbrush, rubber rabbitbrush, Lemmon needlegrass, and beardless wildrye.

Figure 6.—Typical landscape and vegetation in an area of Henhill silt loam, partially drained, 0 to 2 percent slopes. Pastolla soils are in the background.

Figure 7.—Typical landscape and vegetation in an area of Jellycamp-Ollierivas complex, 2 to 9 percent slopes. Note the mound-and-intermound topography. The green grass is in areas of the Ollierivas soil.

Figure 8.—The typical vegetation in areas of Kephart-Quaking complex, 2 to 15 percent slopes, is dominated by ponderosa pine. The pumice material covering the surface of the soils allows maximum development of the roots of this tree species.

Figure 9.—Typical landscape and vegetation in an area of Lassen-Cuppy complex, 2 to 15 percent slopes. The cobbles have been worked to the surface by these soils, which are Vertisols.

Figure 10.—Ponderosa pine and antelope bitterbrush in an area of Longbell gravelly coarse sandy loam, 2 to 15 percent slopes. This vegetation is typical of forested soils in areas where the average annual precipitation is about 30 inches or less.

Figure 11.—Typical vegetation in an area of Stacher very gravelly coarse sandy loam, 30 to 50 percent slopes. This soil is in a frigid temperature regime.

does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include ponderosa pine.

Interpretive Groups

Land capability classification: IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 5S

232—Longbell-Lava flows complex, 2 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 4,100 to 5,000 feet
Slope range: 2 to 15 percent
Vegetation: Ponderosa pine, antelope bitterbrush, and grasses
Mean annual precipitation: 16 to 25 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 49 degrees F
Frost-free period: 80 to 100 days

Composition

Longbell and similar soils: 60 percent
Lava flows: 30 percent
Contrasting inclusions: 10 percent

Characteristics of the Longbell Soil

Position on the landscape: Toe slopes
Parent material: Tephra deposited over volcanic outwash
Typical profile:
2 inches to 0—duff
0 to 3 inches—brown gravelly coarse sandy loam
3 to 30 inches—brown and pale brown gravelly loamy coarse sand
30 to 42 inches—pale brown gravelly loamy sand
42 to 72 inches—very pale brown very gravelly sand
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability class: Moderately rapid over very rapid
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Lava Flows

• Lava flows consist of areas covered by geologically recent lava. They are characterized by sharp, jagged, broken blocks piled in tumbled heaps and have many crevices, sinkholes, and collapsed lava tubes. Most areas are vegetated by such plants as western juniper, ponderosa pine, antelope bitterbrush, and manzanita, but some areas are virtually devoid of vegetation.

Contrasting Inclusions

• Jahjo soils, which are less than 14 inches deep to hard bedrock; in pockets on lava flow outcrops
• Soils that have slopes of as much as 18 percent
• Soils that are less than 60 inches deep to bedrock or have more than 35 percent rock fragments in the profile; near lava flow outcrops

Use and Management

Land use: Timber production or grazing

Woodland vegetation on the Longbell soil

Main tree species: Ponderosa pine
Mean site index for stated species: Ponderosa pine—85
Dunning site class: 3
CACTOS site index: 55

Vegetation on the Lava flows

Common plants: Western chokecherry, curlleaf mountainmahogany, quaking aspen, antelope bitterbrush

Timber production

Major management factors: Longbell—compaction hazard, limited available water capacity, plant competition; Lava flows—depth to rock, rock fragments
Management considerations:
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
• The rock fragments on the surface can interfere with felling, yarding, and other activities involving the use of equipment and can limit the choice of mechanized planting equipment.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.

• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• The Lava flows tend to interfere with felling and yarding and with other uses of equipment. Harvesting should be planned so that traffic is limited in the areas of Lava flows.
• Trees suitable for planting include ponderosa pine.

Woodland grazing

Major management factors: Longbell—coarse texture; Lava flows—depth to rock, rock fragments
Management considerations:
• Forage production is limited by the shallow rooting depth and the rock fragments on the surface in areas of Lava flows and by the coarse texture of the Longbell soil. If seeding is desired, species that are adapted to droughty conditions should be considered.
• The rock fragments on the surface limit access by equipment and by some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Fence construction in areas of the Lava flows requires special design.
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 15 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.

Interpretive Groups

Land capability classification: Longbell—IVe-4, nonirrigated; Lava flows—VIII, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Longbell—5S

233—Longbilly-Modoc complex, 0 to 2 percent slopes

Setting

Landform: Stream terraces
Elevation: 4,100 to 4,200 feet
Slope range: 0 to 2 percent
Vegetation: Grasses and forbs
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 48 to 50 degrees F
Frost-free period: 100 to 120 days

Composition

Longbilly and similar soils: 60 percent
Modoc and similar soils: 25 percent
Contrasting inclusions: 15 percent

Characteristics of the Longbilly Soil

Position on the landscape: Foot slopes
Parent material: Alluvium from extrusive igneous rock and lake deposits
Typical profile:
0 to 4 inches—light gray and light brownish gray silt loam
4 to 54 inches—grayish brown silty clay loam, brown silty clay, and gray silty clay loam
54 to 60 inches—light yellowish brown sandy clay loam
Depth class: Very deep
Drainage class: Moderately well drained
Slowest permeability class: Very slow
Available water capacity: Moderate
Salinity: 0 to 2 mmhos/cm from 0 to 4 inches; 0 to 4 mmhos/cm from 4 to 54 inches; 0 to 2 mmhos/cm from 54 to 60 inches
Sodicity (SAR): 20 to 25 from 0 to 4 inches; 20 to 30 from 4 to 54 inches; 15 to 20 from 54 to 60 inches
Highest shrink-swell potential: High
Surface runoff: Slow
Depth to claypan: 2 to 5 inches
Depth to bedrock: More than 60 inches
Frequency of flooding: Occasional for brief periods from December through April
Depth to the water table: 48 to 60 inches from December through August; 60 to 72 inches from September through October
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Characteristics of the Modoc Soil

Position on the landscape: Toe slopes
Parent material: Mixed alluvium from sedimentary and extrusive igneous rock
Typical profile:
0 to 3 inches—brown sandy loam
3 to 32 inches—brown, yellowish brown, and light yellowish brown sandy clay loam
32 to 60 inches—hardpan
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Salinity: 0 to 2 mmhos/cm from 0 to 32 inches

Sodicity (SAR): 1 to 2 from 3 to 32 inches
Highest shrink-swell potential: Moderate
Surface runoff: Slow
Depth to hardpan: 20 to 40 inches
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Cupvar soils, which are 20 to 40 inches deep to a hardpan and have clay textures throughout; on toe slopes
• Soils that are similar to the Modoc soil but have more than 35 percent clay in the subsoil; on toe slopes

Use and Management

Land use: Irrigated crops or livestock grazing

Irrigated crops

Common crops: Alfalfa, grass-legume hay, barley, and wheat
Major management factors: Longbilly—soil blowing, depth to the claypan, flooding, surface crusting, sodicity and salinity, very slow permeability; Modoc—cemented pan
Management considerations:
• Soil blowing can be controlled by keeping the soil rough, using emergency tillage, stripcropping, and establishing windbreaks.
• Chiseling or subsoiling of the claypan can provide temporary benefits from improved water and air movement and root penetration.
• On soils that have a cemented pan, intensive management of irrigation water is needed to prevent the buildup of a perched water table. Ripping or subsoiling can permanently enhance the root environment.
• The hazard of flooding should be considered before any cropping is done or capital improvements are installed.
• Surface crusting can greatly reduce the water infiltration rate and hinder seedling emergence. Crusting can be minimized by returning crop residue to the soil and using frequent, light applications of irrigation water.
• Sodicity and salinity can be overcome by toxic salt reduction, application of soil amendments, or both.
• Because of high salt levels and high pH levels, the use of this unit for crops is significantly limited. The unit has potential for the development of wetland wildlife habitat.
• Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.

Livestock grazing

Common plants on the Longbilly soil: Beardless wildrye, Lemmon alkaligrass, black greasewood
Common plants on the Modoc soil: Mountain big sagebrush, rubber rabbitbrush, basin wildrye, Lemmon needlegrass
Major management factors: Longbilly—soil blowing, flooding, surface crusting, sodicity; Modoc—none
Management considerations:
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.
• Livestock operations can be impaired by flooding in winter and spring.
• The hazard of flooding should be considered when stand renovation or reestablishment is planned.
• If seeding is desired, species that are adapted to flooding should be considered.
• Surface crusting can greatly reduce the water infiltration rate and hinder seedling emergence. Livestock can be used to break crusts. Maintaining a cover of vegetation minimizes surface crusting.
• Forage production is limited by sodicity. If seeding is desired, species that are adapted to a high content of sodium should be considered.

Interpretive Groups

Land capability classification: Longbilly—IIIs-6, irrigated, and VIIs, nonirrigated; Modoc—IIIe-8, irrigated, and VIe, nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland only in irrigated areas
Range site: Modoc—Loam, MAP 14-16 (21e)

234—Longbilly-Pit complex, 0 to 2 percent slopes

Setting

Landform: Stream terraces
Elevation: 4,100 to 4,200 feet
Slope range: 0 to 2 percent
Vegetation: Grasses and forbs
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 49 to 50 degrees F
Frost-free period: 100 to 120 days

Composition

Longbilly and similar soils: 60 percent

Pit and similar soils: 35 percent
Contrasting inclusions: 5 percent

Characteristics of the Longbilly Soil

Position on the landscape: Foot slopes
Parent material: Alluvium from extrusive igneous rock and lacustrine deposits
Typical profile:
0 to 4 inches—light gray and light brownish gray silt loam
4 to 54 inches—grayish brown, dark grayish brown, and gray silty clay loam
54 to 60 inches—light yellowish brown sandy clay loam
Depth class: Very deep
Drainage class: Moderately well drained
Slowest permeability class: Very slow
Available water capacity: High
Salinity: 0 to 2 mmhos/cm from 0 to 4 inches; 2 to 4 mmhos/cm from 4 to 54 inches; 0 to 2 mmhos/cm from 54 to 60 inches
Sodicity (SAR): 20 to 25 from 0 to 4 inches; 20 to 30 from 4 to 54 inches; 15 to 20 from 54 to 60 inches
Highest shrink-swell potential: High
Surface runoff: Very slow or slow
Depth to claypan: 2 to 5 inches
Depth to bedrock: More than 60 inches
Frequency of flooding: Occasional for brief periods from December through April
Depth to the water table: 48 to 60 inches from December through August; 60 to 72 inches from September through October
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Characteristics of the Pit Soil

Position on the landscape: Toe slopes
Parent material: Alluvium from extrusive igneous rocks and lacustrine deposits
Typical profile:
0 to 4 inches—dark gray silty clay
4 to 40 inches—dark gray clay
40 to 45 inches—light brownish gray silty clay loam
45 to 60 inches—light brownish gray silt loam
Depth class: Very deep
Drainage class: Poorly drained under natural conditions; drainage has been altered in areas of this unit.
Slowest permeability class: Slow
Available water capacity: Very high
Salinity: 0 to 2 mmhos/cm from 0 to 4 inches; 0 to 4 mmhos/cm from 4 to 60 inches
Sodicity (SAR): 20 to 30 from 0 to 4 inches; 15 to 25 from 4 to 40 inches; 10 to 20 from 40 to 45 inches; 5 to 15 from 45 to 60 inches
Highest shrink-swell potential: High
Surface runoff: Very slow
Depth to bedrock: More than 60 inches
Frequency of flooding: Occasional for long periods from December through May
Depth to the water table: 60 to 72 inches from December through May
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Cupvar soils, which are 20 to 40 inches deep to a hardpan; on foot slopes
• Modoc soils, which are 20 to 40 inches deep to a hardpan and have slight salinity; on mounds

Use and Management

Land use: Irrigated crops, livestock grazing, or wetland wildlife habitat

Irrigated crops

Common crops: Grass-legume hay, barley, and wheat
Major management factors: Longbilly—soil blowing, depth to the claypan, flooding, surface crusting, sodicity and salinity, very slow permeability; Pit—flooding, sodicity and salinity, very slow permeability
Management considerations:
• Soil blowing can be controlled by keeping the soil rough, using emergency tillage, stripcropping, and establishing windbreaks.
• Chiseling or subsoiling of the claypan can provide temporary benefits from improved water and air movement and root penetration.
• Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.
• The hazard of flooding should be considered before any cropping is done or capital improvements are installed.
• Surface crusting can greatly reduce the water infiltration rate and hinder seedling emergence. Crusting can be minimized by returning crop residue to the soil and using frequent, light applications of irrigation water.
• The sodicity and salinity can be overcome by toxic salt reduction, application of soil amendments, or both.
• Because of the high salt levels and high pH levels, the use of this unit for crops is significantly limited.

The unit has potential for the development of wetland wildlife habitat.

Livestock grazing

Common plants on the Longbilly soil: Beardless wildrye, basin wildrye, Lemmon alkaligrass, silver sagebrush
Common plants on the Pit soil: Silver sagebrush, beardless wildrye, basin wildrye
Major management factors: Longbilly—soil blowing, flooding, surface crusting, sodicity; Pit—sodicity, shrink-swell
Management considerations:
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.
• Livestock operations can be impaired by flooding in winter and spring.
• The hazard of flooding should be considered when stand renovation or reestablishment is planned.
• If seeding is desired, species that are adapted to flooding should be considered.
• Surface crusting can greatly reduce the water infiltration rate and hinder seedling emergence. Livestock can be used to break crusts. Maintaining a cover of vegetation minimizes surface crusting.
• Forage production is limited by sodicity. If seeding is desired, species that are adapted to a high content of sodium should be considered.
• If seeding is desired, species that are adapted to a high shrink-swell potential should be considered.
• Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Wetland wildlife habitat

Management considerations:
• This unit can provide important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
• Drainage of wetlands in areas of this unit may be restricted by local, State, or Federal laws.

Interpretive Groups

Land capability classification: Longbilly—IIIs-6, irrigated, and VIIs, nonirrigated; Pit—IVw-2, irrigated and nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland

235—Longcreek-Vansickle-Rock outcrop complex, 9 to 30 percent slopes

Setting

Landform: Lava plateaus
Elevation: 4,400 to 5,400 feet
Slope range: 9 to 30 percent
Vegetation: Juniper, sagebrush, and grasses
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 49 degrees F
Frost-free period: 80 to 100 days

Composition

Longcreek and similar soils: 50 percent
Vansickle and similar soils: 30 percent
Rock outcrop: 15 percent
Contrasting inclusions: 5 percent

Characteristics of the Longcreek Soil

Position on the landscape: Foot slopes
Slope: 15 to 30 percent
Important surface feature: About 30 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
0 to 3 inches—brown very cobbly loam
3 to 16 inches—very dark grayish brown very cobbly clay loam
16 inches—fractured basalt
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to claypan: 5 to 10 inches
Depth to bedrock: 14 to 20 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Vansickle Soil

Position on the landscape: Toe slopes
Important surface feature: About 40 to 60 percent of the surface is covered with cobbles and stones.
Parent material: Alluvium from extrusive igneous rock
Slope: 9 to 15 percent
Typical profile:
0 to 1 inch—brown very cobbly loam
1 to 6 inches—yellowish brown very cobbly clay loam

6 to 13 inches—yellowish brown very cobbly clay
13 to 14 inches—hardpan
14 inches—unweathered basalt
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Medium
Depth to claypan: 2 to 5 inches
Depth to hardpan: 10 to 20 inches
Depth to bedrock: 11 to 30 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Rock Outcrop

• Rock outcrop consists of exposures of hard, fractured bedrock. The exposures have nearly vertical sides that abruptly terminate at the adjacent landscape. The vertical sides may drop by as much as 1,000 feet. The Rock outcrop generally is barren, but in some areas a few trees, shrubs, or grasses grow between the rocks.

Contrasting Inclusions

• Cuppy soils, which are 20 to 40 inches deep to hard bedrock and have more than 35 percent clay throughout; on toe slopes
• Deven soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent clay in the subsoil; on foot slopes
• Jellycamp soils, which are less than 20 inches deep to a hardpan over hard bedrock and have more than 35 percent clay in the subsoil; on toe slopes
• Lassen soils, which are 20 to 40 inches deep to hard bedrock and have more than 35 percent clay throughout; on toe slopes
• Lava flow outcrops; on shoulders

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants on the Longcreek soil: Mountain big sagebrush, rubber rabbitbrush, Thurber needlegrass, bluebunch wheatgrass
Common plants on the Vansickle soil: Low sagebrush, Thurber needlegrass, bluebunch wheatgrass
Major management factors: Longcreek—depth to rock, rock fragments, limited available water capacity; Vansickle—water erosion, cemented pan, depth to rock, rock fragments, frost heaving, limited available water capacity; Rock outcrop—depth to rock
Management considerations:
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Frost heaving forces bunchgrasses and sagebrush above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: Longcreek and Vansickle—VIIs, nonirrigated; Rock outcrop—VIII, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Longcreek—Stony Loam, MAP 14-18 (21e); Vansickle—Shallow Cobbly Loam, MAP 14-16 (21e)

236—Lonkey-Datom complex, 2 to 15 percent slopes

Setting

Landform: Knolls
Elevation: 4,100 to 4,400 feet
Slope range: 2 to 15 percent
Vegetation: Sagebrush, grasses, and scattered juniper
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Lonkey and similar soils: 55 percent
Datom and similar soils: 30 percent
Contrasting inclusions: 15 percent

Characteristics of the Lonkey Soil

Position on the landscape: Foot slopes

Parent material: Colluvium from extrusive igneous rock
Typical profile:
0 to 8 inches—grayish brown loam
8 to 13 inches—brown clay loam
13 to 38 inches—yellowish brown clay loam
38 inches—tuff
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Datom Soil

Position on the landscape: Side slopes
Parent material: Residuum from diatomaceous earth
Slope: 2 to 9 percent
Typical profile:
0 to 3 inches—grayish brown clay loam
3 to 12 inches—grayish brown silty clay
12 to 16 inches—light brownish gray silty clay
16 inches—soft diatomaceous earth
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to bedrock: 10 to 20 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Adinot soils, which are less than 20 inches deep to hard bedrock and have less than 35 percent clay in the subsoil; on toe slopes
• Bieber soils, which are less than 20 inches deep to a hardpan and have more than 35 percent clay in the subsoil; in intermounds
• Daphnedale soils, which are 20 to 40 inches deep to weathered bedrock and have more than 35 percent clay in the subsoil; on foot slopes
• Malinda soils, which are less than 20 inches deep to hard bedrock and have less than 35 percent clay in the subsoil; on foot slopes
• Modoc soils, which are 20 to 40 inches deep to a hardpan and have less than 35 percent clay in the subsoil; on mounds
• Soils that are less than 10 inches deep; on shoulders
• Sweagert soils, which are 20 to 40 inches deep to a hardpan and have less than 35 percent clay in the subsoil; on foot slopes and mounds

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants: Bluebunch wheatgrass, mountain big sagebrush, rubber rabbitbrush, basin wildrye
Major management factors: Lonkey—water erosion; Datom—water erosion, depth to rock, frost heaving
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 30 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• Frost heaving forces bunchgrasses and sagebrush above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.

Wood products

Major management factors: Lonkey—water erosion; Datom—water erosion, clayey surface layer
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 30 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Unsurfaced roads and trails are slick when wet and can be impassable during rainy periods.

Interpretive Groups

Land capability classification: Lonkey—IIIe-8, nonirrigated; Datom—IVe-3, nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland only in irrigated areas
Range site: Lonkey and Datom—Diatomaceous Loam, MAP 14-16 (21e)

237—Lonkey-Malinda complex, 2 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 4,800 to 5,400 feet
Slope range: 2 to 15 percent
Vegetation: Grasses and big sagebrush
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 47 to 48 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 90 to 100 days

Composition

Lonkey and similar soils: 50 percent
Malinda and similar soils: 35 percent
Contrasting inclusions: 15 percent

Characteristics of the Lonkey Soil

Position on the landscape: Foot slopes
Important surface feature: About 5 to 10 percent of the surface is covered with cobbles and stones.
Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
0 to 4 inches—gray cobbly sandy loam
4 to 14 inches—dark gray loam and dark grayish brown clay loam
14 to 19 inches—dark brown gravelly clay loam
19 to 24 inches—dark yellowish brown gravelly clay
24 inches—hard conglomerate tuff
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: High
Surface runoff: Slow or medium
Depth to claypan: 20 to 30 inches
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Malinda Soil

Position on the landscape: Foot slopes
Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
0 to 2 inches—grayish brown very gravelly sandy loam
2 to 11 inches—grayish brown gravelly loam and dark grayish brown loam
11 to 16 inches—dark grayish brown clay loam
16 inches—hard conglomerate tuff
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to bedrock: 14 to 20 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Orhood soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on toe slopes
• Ricketts soils, which have more than 35 percent rock fragments in the subsoil; on toe slopes
• Trojan soils, which are 40 to 60 inches deep to hard bedrock; on foot slopes
• Tuff rock outcrops; on shoulders

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants on the Lonkey soil: Mountain big sagebrush, antelope bitterbrush, Idaho fescue, bluebunch wheatgrass
Common plants on the Malinda soil: Antelope bitterbrush, Thurber needlegrass, mountain big sagebrush, Idaho fescue
Major management factors: Lonkey—water erosion; Malinda—depth to rock, limited available water capacity
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• Because of the limited available water capacity, intensive management is needed. Grazing frequency and duration can affect plant composition and vigor.

Interpretive Groups

Land capability classification: Lonkey—IVe-7, nonirrigated; Malinda—VIs, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Lonkey—Cobbly Sandy Loam, MAP 16-18 (21e); Malinda—Gravelly Loam, MAP 14-18 (21e)

238—Lonkey-Malinda complex, 15 to 30 percent slopes

Setting

Landform: Hills
Elevation: 4,800 to 5,400 feet
Slope range: 15 to 30 percent
Vegetation: Grasses and big sagebrush
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 47 to 48 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 90 to 100 days

Composition

Lonkey and similar soils: 40 percent
Malinda and similar soils: 35 percent
Contrasting inclusions: 25 percent

Characteristics of the Lonkey Soil

Position on the landscape: Back slopes
Important surface feature: About 5 to 10 percent of the surface is covered with cobbles and stones.
Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
0 to 4 inches—gray cobbly sandy loam
4 to 14 inches—dark gray loam and dark grayish brown clay loam
14 to 19 inches—dark brown gravelly clay loam
19 to 24 inches—dark yellowish brown gravelly clay
24 inches—hard conglomerate tuff
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: High
Surface runoff: Rapid
Depth to claypan: 20 to 30 inches
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Moderate

Characteristics of the Malinda Soil

Position on the landscape: Back slopes
Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
0 to 2 inches—grayish brown very gravelly sandy loam
2 to 11 inches—grayish brown gravelly loam and dark grayish brown loam
11 to 16 inches—dark grayish brown clay loam
16 inches—hard conglomerate tuff
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: 14 to 20 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Jellycamp soils, which are less than 20 inches deep to a hardpan over hard bedrock; on toe slopes
• Ollierivas soils, which are 20 to 40 inches deep to a hardpan over hard bedrock; on back slopes
• Orhood soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on back slopes
• Soils that are similar to the Lonkey soil but have more than 35 percent rock fragments or clay in the profile; on shoulders
• Soils that are similar to the Malinda soil but are less than 14 inches deep to bedrock; on shoulders
• Trojan soils, which are 40 to 60 inches deep to hard bedrock; on foot slopes
• Tuff rock outcrops; on shoulders

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants on the Lonkey soil: Mountain big sagebrush, antelope bitterbrush, Idaho fescue, bluebunch wheatgrass
Common plants on the Malinda soil: Mountain big sagebrush, antelope bitterbrush, Thurber needlegrass, Idaho fescue
Major management factors: Lonkey—water erosion; Malinda—water erosion, depth to rock, limited available water capacity
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 50 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• Because of the limited available water capacity, intensive management is needed. Grazing frequency and duration can affect plant composition and vigor.

Interpretive Groups

Land capability classification: Lonkey—IVe-7, nonirrigated; Malinda—VIs, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Lonkey—Cobbly Sandy Loam, MAP 16-18 (21e); Malinda—Gravelly Loam, MAP 14-18 (21e)

239—Lonkey-Malinda complex, cool, 15 to 30 percent slopes

Setting

Landform: Hills
Elevation: 4,800 to 5,600 feet
Slope range: 15 to 30 percent
Vegetation: Grasses and big sagebrush
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 45 to 46 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 90 days

Composition

Lonkey and similar soils: 45 percent
Malinda and similar soils: 30 percent
Contrasting inclusions: 25 percent

Characteristics of the Lonkey Soil

Position on the landscape: Back slopes
Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
0 to 16 inches—brown gravelly sandy loam
16 to 25 inches—brown gravelly sandy clay loam
25 to 28 inches—brown gravelly clay
28 inches—hard conglomerate tuff
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: High
Surface runoff: Rapid
Depth to claypan: 20 to 30 inches
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Moderate

Characteristics of the Malinda Soil

Position on the landscape: Back slopes and shoulders
Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
0 to 2 inches—grayish brown very gravelly sandy loam
2 to 6 inches—grayish brown loam
6 to 17 inches—brown clay loam
17 inches—hard conglomerate tuff
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Low
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: 14 to 20 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Orhood soils, which are less than 20 inches deep to hard bedrock; on back slopes
• Soils that have slopes of less than 15 percent; on northeast aspects on toe slopes
• Soils that are similar to the Lonkey soil but have more than 35 percent rock fragments or clay in the profile; on shoulders
• Soils that are similar to the Malinda soil but are less than 14 inches deep to bedrock; on shoulders
• Trojan soils, which are 40 to 60 inches deep to hard bedrock; on foot slopes
• Tuff rock outcrops; on shoulders

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants on the Lonkey soil: Mountain big sagebrush, antelope bitterbrush, bluebunch wheatgrass, Idaho fescue
Common plants on the Malinda soil: Thurber needlegrass, antelope bitterbrush, mountain big sagebrush, Idaho fescue
Major management factors: Lonkey—water erosion; Malinda—water erosion, depth to rock
Management considerations:
• Intensive management of grazing is needed to prevent accelerated erosion in areas of this unit.
• Maintaining a cover of vegetation, such as grass and brush, on about 50 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.

Interpretive Groups

Land capability classification: Lonkey—IVe-7, nonirrigated; Malinda—VIs, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Lonkey—Cool Cobbly Loam, MAP 16-18 (21e); Malinda—Gravelly Loam, MAP 14-18 (21e)

240—Loveness-Fleener complex, 2 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 4,200 to 5,000 feet
Slope range: 2 to 15 percent
Vegetation: Ponderosa pine, shrubs, and grasses
Mean annual precipitation: 16 to 25 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Loveness and similar soils: 50 percent
Fleener and similar soils: 30 percent
Contrasting inclusions: 20 percent

Characteristics of the Loveness Soil

Position on the landscape: Foot slopes
Parent material: Tephra
Typical profile:
1 inch to 0—duff
0 to 7 inches—dark brown sandy loam
7 to 12 inches—reddish brown loam
12 to 19 inches—reddish brown gravelly loam
19 to 35 inches—yellowish red and strong brown gravelly clay loam
35 to 60 inches—strong brown extremely stony clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Fleener Soil

Position on the landscape: Foot slopes
Parent material: Tephra
Slope: 5 to 15 percent
Typical profile:
1 inch to 0—duff
0 to 4 inches—reddish brown sandy loam
4 to 10 inches—reddish brown gravelly sandy loam
10 to 28 inches—reddish brown very gravelly sandy loam and very gravelly sandy clay loam
28 to 60 inches—reddish brown extremely stony sandy clay loam and extremely stony clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

- Lasvar soils, which are 20 to 40 inches deep to a hardpan, are somewhat poorly drained, and have clay throughout; in basins
- Lava flow outcrops; on shoulders
- Pitvar soils, which are 40 to 60 inches deep to a hardpan, are somewhat poorly drained, and have clay throughout; in basins
- Soils that have stones or boulders at a depth of 20 to 40 inches; on back slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Loveness soil

Main tree species: Ponderosa pine, incense cedar, white fir
Mean site index for stated species: Ponderosa pine—82
Dunning site class: 3
CACTOS site index: 54
Common understory plants: Squawcarpet, snowbrush ceanothus, greenleaf manzanita, squirreltail, muleears

Woodland vegetation on the Fleener soil

Main tree species: Ponderosa pine, white fir, incense cedar
Mean site index for stated species: Ponderosa pine—83
Dunning site class: 3
CACTOS site index: 54
Common understory plants: Squawcarpet, squirreltail, greenleaf manzanita, snowbrush ceanothus, muleears

Timber production

Major management factors: Loveness—water erosion, rock fragments, compaction hazard, plant competition; Fleener—water erosion, compaction hazard, limited available water capacity, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• The rock fragments in the profile hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include ponderosa pine.

Interpretive Groups

Land capability classification: Loveness—IIIe-4, nonirrigated; Fleener—IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Loveness—5A; Fleener—5F

241—Loveness-Fleener complex, 15 to 30 percent slopes

Setting

Landform: Hills
Elevation: 4,200 to 5,000 feet
Slope range: 15 to 30 percent
Vegetation: Ponderosa pine, shrubs, and grasses
Mean annual precipitation: 16 to 25 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Loveness and similar soils: 50 percent
Fleener and similar soils: 30 percent
Contrasting inclusions: 20 percent

Characteristics of the Loveness Soil

Position on the landscape: Side slopes
Parent material: Tephra
Typical profile:
1 inch to 0—duff
0 to 7 inches—dark brown sandy loam
7 to 12 inches—reddish brown loam
12 to 19 inches—reddish brown gravelly loam
19 to 35 inches—yellowish red and strong brown gravelly clay loam
35 to 60 inches—strong brown extremely stony clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate

Characteristics of the Fleener Soil

Position on the landscape: Side slopes
Parent material: Tephra
Typical profile:
1 inch to 0—duff
0 to 4 inches—reddish brown sandy loam
4 to 10 inches—reddish brown gravelly sandy loam
10 to 28 inches—reddish brown very gravelly sandy loam and very gravelly sandy clay loam
28 to 60 inches—reddish brown extremely stony sandy clay loam and extremely stony clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

• Lava flow outcrops; on shoulders
• Soils that have stones or boulders at a depth of 20 to 40 inches; on back slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Loveness soil

Main tree species: Ponderosa pine, incense cedar, white fir
Mean site index for stated species: Ponderosa pine—82
Dunning site class: 3
CACTOS site index: 54
Common understory plants: Greenleaf manzanita, squawcarpet, snowbrush ceanothus, squirreltail, muleears

Woodland vegetation on the Fleener soil

Main tree species: Ponderosa pine, white fir, incense cedar
Mean site index for stated species: Ponderosa pine—83
Dunning site class: 3
CACTOS site index: 54
Common understory plants: Greenleaf manzanita, snowbrush ceanothus, squawcarpet, muleears, squirreltail

Timber production

Major management factors: Loveness—water erosion, rock fragments, compaction hazard, plant competition; Fleener—water erosion, compaction hazard, limited available water capacity, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• The rock fragments in the profile hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include ponderosa pine.

Interpretive Groups

Land capability classification: Loveness and Fleener—IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Loveness—5A; Fleener—5F

242—Lunsford loam, 0 to 2 percent slopes

Setting

Landform: Stream terraces
Elevation: 4,180 to 4,260 feet
Slope range: 0 to 2 percent
Vegetation: Rushes, sedges, and grasses
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 50 to 52 degrees F
Frost-free period: 100 to 120 days

Composition

Lunsford and similar soils: 90 percent
Contrasting inclusions: 10 percent

Characteristics of the Lunsford Soil

Parent material: Mixed alluvium from sedimentary and extrusive igneous rock
Typical profile:
0 to 13 inches—gray loam
13 to 29 inches—light gray sandy clay loam
29 to 60 inches—white sandy clay loam
Depth class: Very deep
Drainage class: Somewhat poorly drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Very slow
Depth to bedrock: More than 60 inches
Frequency of flooding: Occasional for brief periods from December through April
Depth to the water table: 12 to 24 inches from November through April; 30 to 40 inches from May through October
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Esperanza soils, which have more than 35 percent clay in the subsoil; on toe slopes
• Henhill soils, which have a dark surface layer more than 20 inches thick; on toe slopes
• Soils that have accumulations of salts in the subsoil; on foot slopes

Use and Management

Land use: Hay and pasture

Pasture

Major management factors: Soil blowing, flooding, high water table
Management considerations:
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.
• Livestock operations can be impaired by flooding in winter and spring.
• The hazard of flooding should be considered when stand renovation or reestablishment is planned.
• If seeding is desired, species that are adapted to flooding should be considered.
• The high water table saturates the soil in winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
• The high water table limits the choice of plant species that can be used for seeding. Frequency, intensity, and duration of grazing affect the composition of the plant community.

Interpretive Groups

Land capability classification: IIIw-2, irrigated and nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland in drained areas that are protected from flooding

243—Malinda extremely gravelly sandy loam, 2 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 5,000 to 5,600 feet
Slope range: 2 to 15 percent
Vegetation: Grasses, big sagebrush, and scattered juniper
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 46 to 48 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Malinda and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Malinda Soil

Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
0 to 3 inches—brown extremely gravelly sandy loam
3 to 8 inches—brown gravelly loam
8 to 14 inches—brown gravelly clay loam
14 inches—hard conglomerate tuff
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to bedrock: 14 to 20 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Lonkey soils, which are 20 to 40 inches deep to hard bedrock; on summits
• Orhood soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on shoulders
• Soils that are less than 14 inches deep to hard bedrock; on shoulders
• Tuff rock outcrops; on shoulders

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants: Mountain big sagebrush, antelope bitterbrush, Thurber needlegrass, Idaho fescue
Major management factors: Depth to rock, limited available water capacity
Management considerations:
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• Because of the limited available water capacity, intensive management is needed. Grazing frequency and duration can affect the composition and vigor of the plant community.

Interpretive Groups

Land capability classification: VIs, nonirrigated

MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Gravelly Loam, MAP 14-18 (21e)

244—Malinda extremely gravelly sandy loam, 15 to 30 percent slopes

Setting

Landform: Hills
Elevation: 5,000 to 5,600 feet
Slope range: 15 to 30 percent
Vegetation: Grasses, big sagebrush, and scattered juniper
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 46 to 48 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Malinda and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Malinda Soil

Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
0 to 3 inches—brown extremely gravelly sandy loam
3 to 8 inches—brown gravelly loam
8 to 14 inches—brown gravelly clay loam
14 inches—hard conglomerate tuff
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: 14 to 20 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Lonkey soils, which are 20 to 40 inches deep to hard bedrock; on toe slopes
• Orhood soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on shoulders
• Soils that have more than 35 percent clay in the subsoil; on foot slopes
• Tuff rock outcrops; on shoulders

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants: Mountain big sagebrush, antelope bitterbrush, Thurber needlegrass, Idaho fescue
Major management factors: Water erosion, depth to rock, limited available water capacity
Management considerations:
• If the soil is grazed to a bare condition, the loss of the surface layer by water erosion severely reduces productivity and the potential to produce vegetation suitable for grazing.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Because of the limited available water capacity, forage plants should not be stressed too frequently or severely during the growing season.
• Fence construction on shallow soils may require special design.
• Maintaining a cover of vegetation, such as grass and brush, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.

Interpretive Groups

Land capability classification: VIs, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Gravelly Loam, MAP 14-18 (21e)

245—Malinda extremely gravelly sandy loam, 30 to 50 percent slopes

Setting

Landform: Hills
Elevation: 5,000 to 5,600 feet
Slope range: 30 to 50 percent
Vegetation: Grasses, big sagebrush, and scattered juniper
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 46 to 48 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Malinda and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Malinda Soil

Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
0 to 3 inches—brown extremely gravelly sandy loam

3 to 8 inches—brown gravelly loam
8 to 14 inches—brown gravelly clay loam
14 inches—hard conglomerate tuff
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: 14 to 20 inches
Hazard of water erosion in bare areas: Moderate or high

Contrasting Inclusions

• Lonkey soils, which are 20 to 40 inches deep to hard bedrock; on toe slopes
• Orhood soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on shoulders
• Soils that are less than 14 inches deep to bedrock; on shoulders
• Soils that have more than 35 percent rock fragments or clay in the subsoil; on back slopes
• Trojan soils, which are 40 to 60 inches deep to hard bedrock; on foot slopes
• Tuff rock outcrops; on shoulders

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants: Thurber needlegrass, mountain big sagebrush, antelope bitterbrush, Idaho fescue
Major management factors: Slope, water erosion, depth to rock, limited available water capacity
Management considerations:
• The slope may limit access by equipment and some kinds of livestock. Fencing, water development, and forage supplements can improve livestock distribution. If seeding is desired, broadcast methods should be considered.
• If the soil is grazed to a bare condition, the loss of the surface layer by water erosion severely reduces productivity and the potential to produce vegetation suitable for grazing.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils may require special design.
• Because of the limited available water capacity, forage plants should not be stressed too frequently or severely during the growing season.
• Maintaining a cover of vegetation, such as grass and brush, on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.

Interpretive Groups

Land capability classification: VIe, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Gravelly Loam, MAP 14-18 (21e)

246—Malinda very cobbly loam, 30 to 50 percent slopes

Setting

Landform: Hills
Elevation: 4,800 to 5,400 feet
Slope range: 30 to 50 percent
Vegetation: Grasses, big sagebrush, and scattered juniper
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 46 to 48 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Malinda and similar soils: 80 percent
Contrasting inclusions: 20 percent

Characteristics of the Malinda Soil

Important surface feature: About 30 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
0 to 3 inches—grayish brown very cobbly loam
3 to 8 inches—dark grayish brown loam
8 to 13 inches—dark grayish brown gravelly clay loam
13 to 17 inches—brown clay loam
17 inches—hard conglomerate tuff
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Low
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: 14 to 20 inches
Hazard of water erosion in bare areas: Moderate or high

Contrasting Inclusions

• Lonkey soils, which are 20 to 40 inches deep to hard bedrock; on foot slopes
• Orhood soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on back slopes
• Soils that are less than 14 inches deep to hard bedrock; on shoulders
• Soils that have more than 35 percent clay in the subsoil; on foot slopes
• Tuff rock outcrops; on shoulders

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants: Mountain big sagebrush, antelope bitterbrush, Thurber needlegrass, Idaho fescue
Major management factors: Water erosion, slope, depth to rock, rock fragments
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The slope and the rock fragments on the surface can limit access by equipment and some kinds of livestock. Fencing, water development, and forage supplements can improve livestock distribution. If seeding is desired, broadcast methods should be considered.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.

Interpretive Groups

Land capability classification: VIe, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Gravelly Loam, MAP 14-18 (21e)

247—Matquaw gravelly sandy loam, 0 to 5 percent slopes

Setting

Landform: Stream terraces
Elevation: 3,300 to 3,360 feet
Slope range: 0 to 5 percent
Vegetation: Grasses
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Matquaw and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Matquaw Soil

Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 4 inches—brown gravelly sandy loam
4 to 10 inches—brown sandy loam
10 to 27 inches—brown very fine sandy loam
27 to 34 inches—brown loamy sand
34 to 72 inches—very gravelly loamy sand
Depth class: Very deep
Drainage class: Somewhat poorly drained
Slowest permeability class: Moderately rapid in the upper part and rapid in the lower part
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Frequency of flooding: Frequent for long periods from December through March
Depth to the water table: 24 to 42 inches from November through February
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Dudgen soils, which are less than 20 inches deep to a hardpan and have more than 35 percent clay in the subsoil; in intermounds
• Esperanza soils, which are 40 to 60 inches deep to a hardpan and have more than 35 percent clay in the subsoil; in intermounds
• Pit soils, which are more than 60 inches deep and have clay throughout; in the lower intermounds
• Winnibulli soils, which are more than 60 inches deep and have less than 35 percent clay in the subsoil; on foot slopes

Use and Management

Land use: Livestock grazing, irrigated crops, homesite development, or wetland wildlife habitat

Livestock grazing

Common plants: Bluegrass, slender wheatgrass
Major management factors: Flooding, high water table
Management considerations:
• Livestock operations can be impaired by flooding and the high water table in winter and spring.

• The flooding and the high water table should be considered when stand renovation or reestablishment is planned. If seeding is desired, species that are adapted to wet conditions should be considered.
• The high water table enhances forage production and extends the green feed period.
• Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Irrigated crops

Common crops: Hay, grain, potatoes, and strawberries
Major management factors: Slope, flooding, high water table
Management considerations:
• Sprinkler irrigation is the most suitable method of applying water.
• The hazard of flooding should be considered before any cropping is done or capital improvements are installed.
• The high water table limits the choice of crops and cultivars and increases the risk of winterkill.
• Careful management of irrigation is needed to avoid raising the water table.

Homesite development

Major management factors: Flooding, wetness, poor filtering capacity
Management considerations:
• Flooding can occur during the winter and early spring. The foundation should be taller than normal, or the buildings should be constructed at the highest elevations. Water should be intercepted by drainage ditches, or a drainage system should be developed around the foundation.
• Flooding can add water to the septic system. Diversion of floodwater helps to overcome this limitation.
• The high water table limits the absorption capacity of the leach field. A mounded leach field or other specialized leach field can help to overcome this limitation.
• The coarse texture limits the filtering capacity. Inadequately filtered effluent can contaminate surface water or ground water. Special designs can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Wetland wildlife habitat

Management considerations:
• This unit can provide important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
• Drainage of wetlands in areas of this unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: IVw-2, irrigated and nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland only in irrigated areas

248—Matquaw very gravelly sandy loam, 0 to 2 percent slopes

Setting

Landform: Stream terraces
Elevation: 3,300 to 3,360 feet
Slope range: 0 to 2 percent
Vegetation: Oak and shrubs
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 46 to 48 degrees F
Mean annual soil temperature: 48 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Matquaw and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Matquaw Soil

Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 4 inches—brown very gravelly sandy loam
4 to 10 inches—brown sandy loam
10 to 27 inches—brown very fine sandy loam
27 to 34 inches—dark yellowish brown loamy sand
34 to 72 inches—dark yellowish brown extremely gravelly loamy sand to very gravelly sandy loam
Depth class: Very deep
Drainage class: Somewhat poorly drained
Slowest permeability class: Moderately rapid in the upper part and rapid in the lower part
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Frequency of flooding: Frequent for long periods from December through March

Depth to the water table: 24 to 42 inches from November through February
Kind of water table: Apparent
Hazard of water erosion in bare areas: None or low

Contrasting Inclusions

• Jadpor soils, which have more than 35 percent rock fragments and less than 35 percent clay in the subsoil and have an argillic horizon; on foot slopes
• Soils that are silt loam or loam throughout; on foot slopes
• Winnibulli soils, which have less than 35 percent clay in the subsoil and have an argillic horizon; on foot slopes

Use and Management

Land use: Irrigated crops, livestock grazing, or wetland wildlife habitat

Irrigated crops

Common crops: Hay, grain, potatoes, and strawberries
Major management factors: Flooding, high water table
Management considerations:
• Flooding and the high water table should be considered before any cropping is done or capital improvements are installed.
• The high water table limits the choice of crops and cultivars and increases the risk of winterkill.
• Careful management of irrigation is needed to avoid raising the water table.

Pasture

Major management factors: Flooding, high water table
• Livestock operations can be impaired by flooding in winter and spring.
• The hazard of flooding should be considered when stand renovation or reestablishment is planned.
• The high water table enhances forage production and extends the green feed period. If seeding is desired, species that are adapted to a high water table should be considered.
• Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Wetland wildlife habitat

Management considerations:
• This unit can provide important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
• Drainage of wetlands in areas of this unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: IVw-2, irrigated and nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland

249—Medici-Blankout complex, 15 to 30 percent slopes

Setting

Landform: Hills
Elevation: 4,300 to 5,400 feet
Slope range: 15 to 30 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 42 to 45 degrees F
Mean annual soil temperature: 40 to 47 degrees F
Frost-free period: 50 to 80 days

Composition

Medici and similar soils: 45 percent
Blankout and similar soils: 35 percent
Contrasting inclusions: 20 percent

Characteristics of the Medici Soil

Position on the landscape: Back slopes
Parent material: Tephra
Typical profile:
2 inches to 0—duff
0 to 1 inch—grayish brown coarse sandy loam
1 to 19 inches—light gray and pink gravelly coarse sandy loam
19 to 51 inches—pink very gravelly coarse sandy loam
51 to 67 inches—pink very gravelly loam
67 to 75 inches—very pale brown, stratified coarse sand
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate

Characteristics of the Blankout Soil

Position on the landscape: Side slopes

Parent material: Tephra
Typical profile:
1 inch to 0—duff
0 to 18 inches—brown coarse sandy loam
18 to 62 inches—strong brown and brown gravelly coarse sandy loam
62 to 81 inches—brown extremely gravelly coarse sandy loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Medlake soils, which are more than 60 inches deep and have pumiceous over medial material; at the higher elevations on back slopes
• Soils that are similar to the Medici soil but have bedrock at a depth of 40 to 60 inches; on back slopes
• Tionesta soils, which are more than 60 inches deep and have pumiceous over medial-skeletal material; on back slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Medici soil

Main tree species: White fir, sugar pine, ponderosa pine, incense cedar
Mean site index for stated species: White fir—75; ponderosa pine—89
Dunning site class: 2
CACTOS site index: 60
Common understory plants: Greenleaf manzanita, snowbrush ceanothus, squawcarpet, Sierra chinkapin, antelope bitterbrush

Woodland vegetation on the Blankout soil

Main tree species: White fir, sugar pine, ponderosa pine, incense cedar
Mean site index for stated species: White fir—67; ponderosa pine—92
Dunning site class: 2
CACTOS site index: 45
Common understory plants: Greenleaf manzanita, snowbrush ceanothus, Sierra chinkapin, squawcarpet, antelope bitterbrush

Timber production

Major management factors: Water erosion, compaction hazard, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir, sugar pine, and ponderosa pine.

Interpretive Groups

Land capability classification: Medici and Blankout—IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Medici and Blankout—6S

250—Medlake gravelly coarse sandy loam, 2 to 15 percent slopes

Setting

Landform: Hills
Elevation: 4,800 to 5,300 feet
Slope range: 2 to 15 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 39 to 44 degrees F

Mean annual soil temperature: 40 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Medlake and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Medlake Soil

Parent material: Windlaid pumiceous material over older tephra
Typical profile:
1 inch to 0—duff
0 to 2 inches—gray, pumiceous gravelly coarse sandy loam
2 to 6 inches—gray, pumiceous very gravelly loamy coarse sand
6 to 32 inches—white extremely gravelly coarse sand
32 to 69 inches—brown and light brown gravelly coarse sandy loam
69 to 75 inches—light brown sandy loam
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability class: Moderately rapid
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Kephart and Quaking soils, which are more than 60 inches deep and have an argillic horizon; on foot slopes
• Rock outcrop; on back slopes
• Soils that have slopes of more than 15 percent
• Tionesta soils, which are more than 60 inches deep and have pumiceous over medial-skeletal material; on side slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, ponderosa pine, sugar pine, incense cedar
Mean site index for stated species: White fir—55; ponderosa pine—81
Dunning site class: 3
CACTOS site index: 52
Common understory plants: Greenleaf manzanita, antelope bitterbrush, squirreltail

Timber production

Major management factors: Pumiceous material, plant competition
Management considerations:
• Water bars constructed with pumice can wash out during periods of intense thunderstorms. Water bars should be constructed with mineral soil material, or roads should be built with rolled grades for erosion control.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir, ponderosa pine, and sugar pine.

Interpretive Groups

Land capability classification: VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 5S

251—Medlake gravelly coarse sandy loam, 15 to 30 percent slopes

Setting

Landform: Hills
Elevation: 4,800 to 5,300 feet
Slope range: 15 to 30 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 39 to 44 degrees F
Mean annual soil temperature: 40 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Medlake and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Medlake Soil

Parent material: Windlaid pumiceous material over older tephra
Typical profile:
1 inch to 0—duff
0 to 2 inches—gray, pumiceous gravelly coarse sandy loam

2 to 6 inches—gray, pumiceous very gravelly loamy coarse sand
6 to 32 inches—white, pumiceous extremely gravelly coarse sand
32 to 69 inches—brown and light brown gravelly coarse sandy loam
69 to 75 inches—light brown sandy loam
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability class: Moderately rapid
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: High

Contrasting Inclusions

• Blankout soils, which have medial material over a subsoil that has less than 35 percent clay; on toe slopes
• Medici soils, which have medial material over a subsoil that has more than 35 percent rock fragments and less than 35 percent clay; on back slopes
• Rock outcrop; on escarpments
• Soils that have slopes of more than 30 percent
• Tionesta soils, which have pumiceous over medial-skeletal material; on toe slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: Jeffrey pine, ponderosa pine, white fir, incense cedar, sugar pine
Mean site index for stated species: Jeffrey pine and ponderosa pine—81; white fir—55
Dunning site class: 3
CACTOS site index: 52
Common understory plants: Greenleaf manzanita, antelope bitterbrush, squirreltail

Timber production

Major management factors: Pumiceous material, water erosion, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The extremely porous nature of the pumiceous material allows maximum root development for seedlings and tree growth.
• Water bars constructed with pumice can wash out during periods of intense thunderstorms. Water bars should be constructed with finer soil material, or the roads should be built with rolled grades for erosion control.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir, ponderosa pine, and sugar pine.

Interpretive Groups

Land capability classification: VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 5S

252—Modoc loam, slightly sodic, 0 to 2 percent slopes

Setting

Landform: Stream terraces
Elevation: 4,100 to 4,200 feet
Slope range: 0 to 2 percent
Vegetation: Grasses and big sagebrush
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 50 to 52 degrees F
Frost-free period: 100 to 120 days

Composition

Modoc and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Modoc Soil

Parent material: Mixed alluvium from sedimentary and extrusive igneous rock
Typical profile:
0 to 3 inches—brown loam
3 to 32 inches—brown, yellowish brown, and light yellowish brown sandy clay loam

32 to 60 inches—hardpan
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Salinity: 0 to 2 mmhos/cm from 0 to 43 inches
Sodicity (SAR): 1 to 2 from 32 to 43 inches
Highest shrink-swell potential: Moderate
Surface runoff: Slow
Depth to hardpan: 20 to 40 inches
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: None or low

Contrasting Inclusions

- Bieber soils, which are less than 20 inches deep to a hardpan; in intermounds
- Dotta soils, which are more than 60 inches deep and have less than 35 percent clay in the subsoil; on foot slopes
- Esperanza soils, which are more than 60 inches deep; on toe slopes
- Henhill soils, which are more than 60 inches deep and have less than 35 percent clay in the subsoil; on the lower toe slopes

Use and Management

Land use: Irrigated crops or livestock grazing

Irrigated crops

Common crops: Alfalfa, grass-legume hay, barley, wheat, and potatoes
Major management factors: Soil blowing, cemented pan, sodicity and salinity
Management considerations:
- Soil blowing can be controlled by keeping the soil rough, using emergency tillage, stripcropping, and establishing windbreaks.
- On soils that have a cemented pan, intensive management of irrigation water is needed to prevent the buildup of a perched water table. Ripping or subsoiling can permanently enhance the root environment.
- Sodicity and salinity can be overcome by toxic salt reduction, application of soil amendments, or both.

Livestock grazing

Common plants: Mountain big sagebrush, rubber rabbitbrush, basin wildrye, Lemmon needlegrass
Major management factors: Soil blowing
Management considerations:
- Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.

Interpretive Groups

Land capability classification: IIIs-8, irrigated, and VIs, nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland only in irrigated areas
Range site: Loam, MAP 14-16 (21e)

253—Modoc sandy loam, 2 to 5 percent slopes

Setting

Landform: Stream terraces
Elevation: 4,000 to 4,200 feet
Slope range: 2 to 5 percent
Vegetation: Grasses and big sagebrush
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 50 to 52 degrees F
Frost-free period: 100 to 120 days

Composition

Modoc and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Modoc Soil

Parent material: Mixed alluvium from sedimentary and extrusive igneous rock
Typical profile:
0 to 3 inches—brown sandy loam
3 to 32 inches—brown, yellowish brown, and light yellowish brown sandy clay loam
32 to 60 inches—hardpan
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to hardpan: 20 to 40 inches
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

- Bieber soils, which are less than 20 inches deep to a hardpan; in intermounds
- Dotta soils, which are more than 60 inches deep and have less than 35 percent clay in the subsoil; on foot slopes
- Esperanza soils, which are more than 60 inches deep; on toe slopes

• Henhill soils, which are more than 60 inches deep and have less than 35 percent clay in the subsoil; on the lower toe slopes

Use and Management

Land use: Irrigated crops or livestock grazing

Irrigated crops

Common crops: Alfalfa, grass-legume hay, barley, wheat, and potatoes
Major management factors: Slope, cemented pan
Management considerations:
• Sprinkler irrigation is the most suitable method of applying water.
• On soils that have a cemented pan, intensive management of irrigation water is needed to prevent the buildup of a perched water table. Ripping or subsoiling can permanently enhance the root environment.

Livestock grazing

Common plants: Mountain big sagebrush, rubber rabbitbrush, basin wildrye, Lemmon needlegrass
Major management factors: None

Interpretive Groups

Land capability classification: IIIe-8, irrigated, and VIe, nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland only in irrigated areas
Range site: Loam, MAP 14-16 (21e)

254—Mounthat-Rock outcrop complex, 50 to 75 percent slopes

Setting

Landform: Mountains
Elevation: 4,500 to 6,300 feet
Slope range: 50 to 75 percent
Vegetation: Mixed conifers
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 39 to 44 degrees F
Mean annual soil temperature: 41 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Mounthat and similar soils: 70 percent
Rock outcrop: 20 percent
Contrasting inclusions: 10 percent

Characteristics of the Mounthat Soil

Position on the landscape: Back slopes
Parent material: Debris flow over residuum from nonvesicular material over vesicular andesitic basalt
Typical profile:
1 inch to 0—duff
0 to 10 inches—dark brown and brown gravelly sandy loam
10 to 27 inches—brown very cobbly sandy loam
27 inches—weathered andesite
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Very rapid
Depth to bedrock: 4 to 27 inches
Hazard of water erosion in bare areas: High

Characteristics of the Rock Outcrop

• Rock outcrop consists of exposures of hard, fractured bedrock. The exposures have nearly vertical sides that abruptly terminate at the adjacent landscape. The vertical sides may drop by as much as 1,000 feet. The Rock outcrop generally is barren, but in some areas a few trees, shrubs, or grasses grow between the rocks.

Contrasting Inclusions

• Obie soils, which are 40 to 60 inches deep; on side slopes
• Soils that are similar to the Mounthat soil but are less than 20 inches deep to bedrock; on shoulders
• Soils that are similar to the Mounthat soil but have less than 35 percent rock fragments in the profile; on side slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Mounthat soil

Main tree species: White fir, sugar pine, ponderosa pine, California black oak, incense cedar
Mean site index for stated species: White fir—69
Dunning site class: 1
CACTOS site index: 84
Common understory plants: Greenleaf manzanita, gooseberry, serviceberry, brackenfern, princes pine

Timber production

Major management factors: Mounthat—water erosion, very rapid runoff, slope, depth to rock, plant competition, hazard of fire damage; Rock

outcrop—very rapid runoff, slope, depth to rock

Management considerations:

• Maintaining the understory vegetation is essential in controlling erosion.

• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.

• Erosion can be severe during intense thunderstorms in the summer and warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.

• The very rapid runoff rate can result in severe erosion if water is allowed to concentrate in bare areas, such as skid trails or roads.

• Using conventional harvesting methods is difficult because of the slope.

• The slope limits the use of wheeled and tracked equipment in skidding operations. End lining generally causes less disturbance of the soil.

• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.

• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.

• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.

• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.

• The Rock outcrop tends to interfere with felling and yarding and with other uses of equipment. Harvesting should be planned so that vehicular traffic is limited in the areas of Rock outcrop.

• Trees suitable for planting include white fir and ponderosa pine.

Interpretive Groups

Land capability classification: Mounthat—VIIe, nonirrigated; Rock outcrop—VIII, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Mounthat—11R

255—Murken very stony loam, 15 to 30 percent slopes

Setting

Landform: Lava plateau escarpments
Elevation: 3,500 to 4,000 feet
Slope range: 15 to 30 percent
Vegetation: Junipers, pine, white oak, and shrubs
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 47 to 49 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Murken and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Murken Soil

Important surface feature: About 30 to 50 percent of the surface is covered with stones and cobbles.
Parent material: Colluvium and eolian deposits from extrusive igneous rock
Typical profile:
0 to 7 inches—yellowish brown and dark yellowish brown very stony loam
7 to 23 inches—brown bouldery loam
23 to 33 inches—brown very bouldery loam
33 inches—fractured basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Ollierivas soils, which are 20 to 40 inches deep to a hardpan over hard bedrock; on toe slopes
• Rock outcrop; on shoulders
• Rubble land; on escarpments

Use and Management

Land use: Wood products or grazing

Woodland vegetation

Main woodland species: Ponderosa pine, Oregon white oak, Digger pine, western juniper

Mean site index for stated species: Ponderosa pine—63
Dunning site class: 4
CACTOS site index: 44
Common understory plants: Buckbrush, California redbud, elder, Thurber needlegrass, birchleaf mountainmahogany, bottlebrush squirreltail

Wood products

Major management factors: Water erosion, rock fragments, limited available water capacity
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The rock fragments on the surface can interfere with the harvesting of wood products.
• The limited available water capacity hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.

Woodland grazing

Major management factors: Water erosion, rock fragments
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.

Interpretive Groups

Land capability classification: VIs, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 3X

256—Nanny gravelly sandy loam, 0 to 9 percent slopes

Setting

Landform: Alluvial fans
Elevation: 4,000 to 4,200 feet
Slope range: 0 to 9 percent
Vegetation: Mixed conifers
Mean annual precipitation: 50 to 60 inches
Mean annual air temperature: 47 to 50 degrees F
Mean annual soil temperature: 41 to 46 degrees F
Frost-free period: 80 to 100 days

Composition

Nanny and similar soils: 80 percent
Contrasting inclusions: 20 percent

Characteristics of the Nanny Soil

Parent material: Alluvium from basic igneous rock
Typical profile:
1 inch to 0—duff
0 to 8 inches—brown gravelly sandy loam
8 to 60 inches—strong brown and yellowish brown very gravelly sandy loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: None or low
Hazard of soil blowing in bare areas: None

Contrasting Inclusions

• Neer soils, which are 20 to 40 inches deep to weathered bedrock; on foot slopes
• Ponto soils, which are more than 60 inches deep and have less than 35 percent rock fragments in the profile; on toe slopes
• Riverwash; next to stream channels
• Soils that have less than 35 percent rock fragments in the profile; on foot slopes
• Wyntoon soils, which are more than 60 inches deep and have an argillic horizon; on toe slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, Jeffrey pine, ponderosa pine, lodgepole pine, sugar pine, knobcone pine
Mean site index for stated species: Jeffrey pine and ponderosa pine—96
Dunning site class: 2
CACTOS site index: 70
Common understory plants: Greenleaf manzanita, serviceberry, needlegrass, bitter cherry, squirreltail, squawcarpet, rabbitbrush

Timber production

Major management factors: Compaction hazard, plant competition
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction

reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include ponderosa pine and white fir.

Interpretive Groups

Land capability classification: IIIe-4, irrigated and nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 7F

257—Neer gravelly sandy loam, 50 to 75 percent slopes

Setting

Landform: Mountains
Elevation: 2,700 to 5,000 feet
Slope range: 50 to 75 percent
Vegetation: Mixed conifers
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 45 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Neer and similar soils: 75 percent
Contrasting inclusions: 25 percent

Characteristics of the Neer Soil

Parent material: Glacial outwash from extrusive igneous rock
Typical profile:
1 inch to 0—duff
0 to 16 inches—dark grayish brown and brown gravelly sandy loam
16 to 36 inches—yellowish brown very gravelly sandy loam
36 inches—weathered andesite
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Very rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: High or very high

Contrasting Inclusions

• Kindig soils, which are 40 to 60 inches deep to weathered bedrock; on foot slopes
• Neuns soils, which are 20 to 40 inches deep to hard bedrock and have minor ash influence; on shoulders
• Rubble land; on shoulders
• Soils that have than 35 percent rock fragments in the profile; on foot slopes

Use and Management

Land use: Timber production or homesite development

Woodland vegetation

Main tree species: White fir, incense cedar, sugar pine, ponderosa pine, Douglas-fir, California black oak
Mean site index for stated species: White fir—78
Dunning site class: 1
CACTOS site index: 77
Common understory plants: Bluebunch wheatgrass, serviceberry, greenleaf manzanita, Sierra chinkapin, snowbrush ceanothus, antelope bitterbrush, needlegrass

Timber production

Major management factors: Water erosion, very rapid runoff, slope, depth to rock, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Maintaining the understory vegetation is essential in controlling erosion.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• The very rapid runoff rate can result in severe erosion if water is allowed to concentrate in bare areas, such as skid trails or roads.
• Using conventional harvesting methods is difficult because of the slope.
• The slope limits the use of wheeled and tracked

equipment in skidding operations. End lining generally causes less disturbance of the soil.
- Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
- Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
- Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
- Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
- Trees suitable for planting include white fir, ponderosa pine, and Douglas-fir.

Homesite development

Major management factors: Water erosion, slope, depth to rock, poor filtering capacity
Management considerations:
- Maintaining a permanent ground cover on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- During construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.
- If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.
- The limited depth to rock inhibits the filtering capacity of the leach fields or can prevent their placement. If the leach lines are placed too close to the bedrock, ground water may be contaminated by the effluent.
- The coarse texture limits the filtering capacity. Inadequately filtered effluent can contaminate surface water or ground water. Special designs can help to overcome this limitation.
- If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: VIIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 13R

258—Neer-Ponto, dark surface, complex, 30 to 50 percent slopes

Setting

Landform: Lava plateaus and mountains
Elevation: 3,000 to 4,500 feet
Slope range: 30 to 50 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Mean annual soil temperature: 48 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Neer and similar soils: 55 percent
Ponto and similar soils: 30 percent
Contrasting inclusions: 15 percent

Characteristics of the Neer Soil

Position on the landscape: Side slopes
Parent material: Tephra
Typical profile:
1 inch to 0—duff
0 to 10 inches—dark brown gravelly sandy loam
10 to 24 inches—dark brown very gravelly sandy loam
24 to 39 inches—brown very gravelly sandy loam
39 inches—weathered andesite
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: High

Characteristics of the Ponto Soil

Position on the landscape: Foot slopes
Parent material: Volcanic ash
Typical profile:
1 inch to 0—duff
0 to 6 inches—dark brown sandy loam
6 to 62 inches—brown sandy loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches

Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

- Gasper soils, which have more than 35 percent rock fragments and less than 35 percent clay in the subsoil and have an argillic horizon; on side slopes
- Scarface soils, which have less than 35 percent clay in the subsoil and have an argillic horizon; on foot slopes
- Soils that are similar to the Neer soil but are less than 20 inches deep; on shoulders
- Soils that are similar to the Ponto soil but have more than 35 percent coarse fragments; on foot slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Ponto soil

Main tree species: White fir, ponderosa pine, incense cedar, Douglas-fir, sugar pine
Mean site index for stated species: White fir—87; ponderosa pine—137
Dunning site class: 1
CACTOS site index: 75
Common understory plants: Greenleaf manzanita, squawcarpet, Sierra chinkapin, deerbrush, snowbrush ceanothus, and bitter cherry

Woodland vegetation on the Neer soil

Main tree species: White fir, ponderosa pine, incense cedar, Douglas-fir, sugar pine, California black oak
Mean site index for stated species: White fir—78; ponderosa pine—105
Dunning site class: 2
CACTOS site index: 65
Common understory plants: Serviceberry, snowbrush ceanothus, needlegrass, greenleaf manzanita, Sierra chinkapin, antelope bitterbrush

Timber production

Major management factors: Neer—water erosion, slope, depth to rock, plant competition, hazard of fire damage; Ponto—water erosion, slope, plant competition, hazard of fire damage
Management considerations:
- Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 50 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- Roads and landings can be protected from erosion by constructing water bars.
- Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
- The slope limits the kinds of equipment that can be used in forest management.
- Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
- Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
- Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
- Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
- Trees suitable for planting include ponderosa pine.

Interpretive Groups

Land capability classification: Neer and Ponto—VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Neer—13R; Ponto—15A

259—Neer-Ponto complex, 2 to 30 percent slopes

Setting

Landform: Lava plateaus
Elevation: 2,700 to 5,000 feet
Slope range: 2 to 30 percent
Vegetation: Mixed conifers
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 45 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Neer and similar soils: 40 percent
Ponto and similar soils: 40 percent
Contrasting inclusions: 20 percent

Characteristics of the Neer Soil

Position on the landscape: Foot slopes
Parent material: Glacial outwash from extrusive igneous rock

Typical profile:
1 inch to 0—duff
0 to 16 inches—dark grayish brown and brown gravelly sandy loam
16 to 36 inches—yellowish brown very gravelly sandy loam
36 inches—weathered andesite
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Slow to rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Ponto Soil

Position on the landscape: Toe slopes
Parent material: Volcanic ash
Typical profile:
2 inches to 0—duff
0 to 8 inches—dark brown sandy loam
8 to 68 inches—yellowish brown and very pale brown sandy loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Slow to rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

- Kindig soils, which are 40 to 60 inches deep to weathered bedrock; on foot slopes
- Neuns soils, which are 20 to 40 inches deep to hard bedrock and have minor ash influence; on escarpments
- Rubble land; on escarpments

Use and Management

Land use: Timber production or homesite development

Woodland vegetation on the Neer soil

Main tree species: White fir, incense cedar, sugar pine, ponderosa pine, Douglas-fir, California black oak
Mean site index for stated species: White fir—78; ponderosa pine—105; Douglas-fir—110
Dunning site class: 1
CACTOS site index: 77
Common understory plants: Bluebunch wheatgrass, serviceberry, snowbrush ceanothus, greenleaf manzanita, Sierra chinkapin, antelope bitterbrush, needlegrass

Woodland vegetation on the Ponto soil

Main tree species: White fir, incense cedar, sugar pine, ponderosa pine, Douglas-fir
Mean site index for stated species: White fir—87; ponderosa pine—137
Dunning site class: 1A
CACTOS site index: 95
Common understory plants: Greenleaf manzanita, deerbrush, squawcarpet, bitter cherry, antelope bitterbrush, Sierra chinkapin, whitethorn ceanothus, snowbrush ceanothus, tanoak

Timber production

Major management factors: Neer—water erosion, depth to rock, plant competition; Ponto—water erosion, plant competition
Management considerations:
- Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 70 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- Roads and landings can be protected from erosion by constructing water bars.
- Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
- Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
- Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. Proper use of organic materials is needed to reduce the fire hazard.
- Trees suitable for planting include white fir, ponderosa pine, and Douglas-fir.

Homesite development

Major management factors: Neer—water erosion, slope, depth to rock, poor filtering capacity; Ponto—water erosion, slope
Management considerations:
- Maintaining a permanent ground cover on about 70 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- During construction, all bare ground should be

mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.
• If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.
• The limited depth to rock inhibits the filtering capacity of the leach fields or can prevent their placement. If the leach lines are placed too close to the bedrock, ground water may be contaminated by the effluent.
• The coarse texture limits the filtering capacity. Inadequately filtered effluent can contaminate surface water or ground water. Special designs can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Neer and Ponto—IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Neer—13F; Ponto—15A

260—Neer-Ponto complex, 30 to 50 percent slopes

Setting

Landform: Mountains
Elevation: 2,700 to 5,000 feet
Slope range: 30 to 50 percent
Vegetation: Mixed conifers
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 45 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Neer and similar soils: 45 percent
Ponto and similar soils: 35 percent
Contrasting inclusions: 20 percent

Characteristics of the Neer Soil

Position on the landscape: Side slopes
Parent material: Glacial outwash from extrusive igneous rock
Typical profile:
1 inch to 0—duff
0 to 16 inches—dark grayish brown and brown gravelly sandy loam
16 to 36 inches—yellowish brown very gravelly sandy loam
36 inches—weathered andesite
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Moderate or high

Characteristics of the Ponto Soil

Position on the landscape: Foot slopes
Parent material: Volcanic ash
Typical profile:
2 inches to 0—duff
0 to 8 inches—dark brown sandy loam
8 to 68 inches—yellowish brown, light yellowish brown, and very pale brown sandy loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: High

Contrasting Inclusions

• Kindig soils, which are 40 to 60 inches deep to weathered bedrock; on foot slopes
• Neuns soils, which are 20 to 40 inches deep to hard bedrock and have minor ash influence; on escarpments
• Rubble land; on escarpments

Use and Management

Land use: Timber production or homesite development

Woodland vegetation on the Neer soil

Main tree species: White fir, incense cedar, sugar pine, ponderosa pine, Douglas-fir, California black oak
Mean site index for stated species: White fir—78; ponderosa pine—105; Douglas-fir—110
Dunning site class: 1
CACTOS site index: 77
Common understory plants: Greenleaf manzanita, snowbrush ceanothus, antelope bitterbrush,

needlegrass, bluebunch wheatgrass, serviceberry, Sierra chinkapin

Woodland vegetation on the Ponto soil

Main tree species: White fir, incense cedar, sugar pine, ponderosa pine, Douglas-fir
Mean site index for stated species: White fir—87; ponderosa pine—137
Dunning site class: 1A
CACTOS site index: 95
Common understory plants: Greenleaf manzanita, Sierra chinkapin, whitethorn ceanothus, deerbrush, squawcarpet, snowbrush ceanothus, tanoak, bitter cherry, antelope bitterbrush

Timber production

Major management factors: Neer—water erosion, slope, depth to rock, plant competition, hazard of fire damage; Ponto—water erosion, slope, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• The slope limits the kinds of equipment that can be used in forest management.
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir, ponderosa pine, and Douglas-fir.

Homesite development

Major management factors: Neer—water erosion, slope, depth to rock, poor filtering capacity; Ponto—water erosion, slope
Management considerations:
• Maintaining a permanent ground cover on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• During construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.
• If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.
• The limited depth to rock inhibits the filtering capacity of the leach fields or can prevent their placement. If the leach lines are placed too close to the bedrock, ground water may be contaminated by the effluent.
• The coarse texture limits the filtering capacity. Inadequately filtered effluent can contaminate surface water or ground water. Special designs can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Neer and Ponto—VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Neer—13F; Ponto—15A

261—Neuns-Kettlebelly complex, 50 to 75 percent slopes

Setting

Landform: Mountains
Elevation: 2,700 to 3,500 feet
Slope range: 50 to 75 percent
Vegetation: Mixed conifers
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Neuns and similar soils: 45 percent
Kettlebelly and similar soils: 35 percent
Contrasting inclusions: 20 percent

Characteristics of the Neuns Soil

Position on the landscape: Back slopes and shoulders

Parent material: Slope alluvium from metasedimentary rock
Typical profile:
3 inches to 0—duff
0 to 7 inches—dark grayish brown and yellowish brown gravelly sandy loam
7 to 32 inches—yellowish brown very gravelly sandy loam and light yellowish brown very gravelly loam
32 inches—metasedimentary rock
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Very rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: High or very high

Characteristics of the Kettlebelly Soil

Position on the landscape: Back slopes
Parent material: Slope alluvium from metasedimentary rock
Typical profile:
1 inch to 0—duff
0 to 10 inches—light brown and brownish yellow gravelly loam
10 to 67 inches—reddish yellow silty clay loam and silty clay
67 to 99 inches—reddish yellow silty clay loam and pink silt loam
99 inches—metasedimentary rock
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Very rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: High or very high

Contrasting Inclusions

• Etsel soils, which are less than 20 inches deep to hard bedrock; on shoulders and back slopes
• Kindig soils, which are 40 to 60 inches deep to weathered bedrock; on back slopes
• Rock outcrop; on shoulders and back slopes
• Soils that are similar to the Kettlebelly soil but have more than 35 percent rock fragments in the profile; on back slopes and summits
• Soils that are similar to the Kettlebelly soil but are less than 60 inches deep to bedrock; on back slopes and summits

Use and Management

Land use: Timber production

Woodland vegetation on the Neuns soil

Main tree species: Ponderosa pine, incense cedar, California black oak, Douglas-fir, sugar pine
Mean site index for stated species: Ponderosa pine—103; Douglas-fir—100
Dunning site class: 3
CACTOS site index: 59
Common understory plants: Sierra chinkapin, whitethorn ceanothus, squawcarpet, greenleaf manzanita, deerbrush, Pacific dogwood, snowberry

Woodland vegetation on the Kettlebelly soil

Main tree species: Ponderosa pine, incense cedar, California black oak, sugar pine, white fir, Douglas-fir
Mean site index for stated species: Ponderosa pine—118; Douglas-fir—106
Dunning site class: 2
CACTOS site index: 75
Common understory plants: Whitethorn ceanothus, squawcarpet, California hazel, tanoak, deerbrush, Pacific dogwood, brackenfern

Timber production

Major management factors: Neuns—water erosion, very rapid runoff, slope, depth to rock, rock fragments, limited available water capacity, plant competition, hazard of fire damage; Kettlebelly—water erosion, very rapid runoff, slope, compaction hazard, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Maintaining the understory vegetation is essential in controlling erosion.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• The very rapid runoff rate can result in severe erosion if water is allowed to concentrate in bare areas, such as skid trails or roads.
• Using conventional harvesting methods is difficult because of the slope.

• The slope limits the use of wheeled and tracked equipment in skidding operations. End lining generally causes less disturbance of the soil.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
• The rock fragments in the profile hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include sugar pine, ponderosa pine, and Douglas-fir.

Interpretive Groups

Land capability classification: Neuns and Kettlebelly—VIIe, nonirrigated
MLRA: 5
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Neuns—8R; Kettlebelly—6R

262—Neuns-Kettlebelly, dry, complex, 50 to 75 percent slopes

Setting

Landform: Mountains
Elevation: 2,500 to 3,800 feet
Slope range: 50 to 75 percent
Vegetation: Mixed conifers, oaks, and shrubs
Mean annual precipitation: 50 to 60 inches
Mean annual air temperature: 45 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 100 to 140 days

Composition

Neuns and similar soils: 45 percent
Kettlebelly and similar soils: 35 percent
Contrasting inclusions: 20 percent

Characteristics of the Neuns Soil

Position on the landscape: Back slopes
Parent material: Slope alluvium from metasedimentary rock
Typical profile:
3 inches to 0—duff
0 to 3 inches—dark grayish brown gravelly sandy loam
3 to 32 inches—yellowish brown very gravelly sandy loam and light yellowish brown very gravelly loam
32 inches—metasedimentary rock
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Very rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: High or very high

Characteristics of the Kettlebelly Soil

Position on the landscape: Back slopes
Parent material: Slope alluvium from metasedimentary rock
Typical profile:
3 inches to 0—duff
0 to 4 inches—brown gravelly loam
4 to 22 inches—light yellowish brown gravelly loam
22 to 30 inches—light yellowish brown gravelly clay loam
30 to 99 inches—very pale brown silty clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Very rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: High or very high

Contrasting Inclusions

• Kindig soils, which are 40 to 60 inches deep to weathered bedrock; on back slopes
• Rock outcrop; on shoulders and back slopes

• Soils that are similar to the Kettlebelly soil but are less than 60 inches deep to bedrock; on back slopes

Use and Management

Land use: Timber production or homesite development

Woodland vegetation on the Neuns soil

Main tree species: Incense cedar, sugar pine, ponderosa pine, Douglas-fir, California black oak
Mean site index for stated species: Ponderosa pine—103; Douglas-fir—100
Dunning site class: 3
CACTOS site index: 59
Common understory plants: Manzanita, Sierra chinkapin, whitethorn ceanothus, deerbrush, squawcarpet, Pacific dogwood, snowberry

Woodland vegetation on the Kettlebelly soil

Main tree species: Incense cedar, ponderosa pine, Douglas-fir, California black oak
Mean site index for stated species: Ponderosa pine—108
Dunning site class: 2
CACTOS site index: 75
Common understory plants: Sticky whiteleaf manzanita, deerbrush, buckbrush, blue wildrye, mountain brome, tanoak

Timber production

Major management factors: Neuns—water erosion, very rapid runoff, slope, depth to rock, rock fragments, limited available water capacity, plant competition, hazard of fire damage; Kettlebelly—water erosion, very rapid runoff, slope, compaction hazard, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Maintaining the understory vegetation is essential in controlling erosion.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The very rapid runoff rate can result in severe erosion if water is allowed to concentrate in bare areas, such as skid trails or roads.
• Using conventional harvesting methods is difficult because of the slope.
• The slope limits the use of wheeled and tracked equipment in skidding operations. End lining generally causes less disturbance of the soil.
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
• The rock fragments in the profile hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include sugar pine, ponderosa pine, and Douglas-fir.

Homesite development

Major management factors: Neuns—water erosion, slope, depth to rock; Kettlebelly—water erosion, slope, restricted permeability
Management considerations:
• Maintaining a permanent ground cover on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• During construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.
• If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.
• The limited depth to rock inhibits the filtering capacity of the leach fields or can prevent their placement. If the leach lines are placed too close to the bedrock, ground water may be contaminated by the effluent.
• The restricted permeability reduces the absorption

capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Neuns and Kettlebelly—VIIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Neuns and Kettlebelly—8R

263—Neuns-Kindig complex, 50 to 75 percent slopes

Setting

Landform: Mountains
Elevation: 2,500 to 5,000 feet
Slope range: 50 to 75 percent
Vegetation: Mixed conifers, oaks, and shrubs
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 45 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Neuns and similar soils: 50 percent
Kindig and similar soils: 30 percent
Contrasting inclusions: 20 percent

Characteristics of the Neuns Soil

Position on the landscape: Back slopes
Parent material: Slope alluvium from metasedimentary rock
Typical profile:
3 inches to 0—duff
0 to 3 inches—dark grayish brown gravelly sandy loam
3 to 32 inches—yellowish brown very gravelly sandy loam and light yellowish brown very gravelly loam
32 inches—metasedimentary rock
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Very rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: High or very high

Characteristics of the Kindig Soil

Position on the landscape: Back slopes
Parent material: Slope alluvium from metasedimentary rock
Typical profile:
3 inches to 0—duff
0 to 2 inches—very dark grayish brown gravelly sandy loam
2 to 8 inches—light brown gravelly sandy loam
8 to 14 inches—light brown very gravelly sandy loam
14 to 49 inches—light brown very cobbly loam
49 inches—weathered shale
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Very rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: High or very high

Contrasting Inclusions

• Etsel soils, which are less than 20 inches deep to hard bedrock; on shoulders
• Kettlebelly soils, which are more than 60 inches deep, have an argillic horizon, and have less than 35 percent rock fragments in the profile; on side slopes
• Neer soils, which are 20 to 40 inches deep to weathered bedrock; on shoulders
• Soils that have a cobbly profile

Use and Management

Land use: Timber production or homesite development

Woodland vegetation on the Neuns soil

Main tree species: Ponderosa pine, incense cedar, sugar pine, California black oak, Douglas-fir
Mean site index for stated species: Ponderosa pine—103; Douglas-fir—100
Dunning site class: 3
CACTOS site index: 59
Common understory plants: Greenleaf manzanita, Sierra chinkapin, whitethorn ceanothus, deerbrush, squawcarpet, Pacific dogwood, snowberry

Woodland vegetation on the Kindig soil

Main tree species: Ponderosa pine, incense cedar, white fir, Douglas-fir, California black oak, sugar pine
Mean site index for stated species: White fir—52; ponderosa pine—89; Douglas-fir—110

Dunning site class: 2
CACTOS site index: 67
Common understory plants: Greenleaf manzanita, Sierra chinkapin, whitethorn ceanothus, deerbrush, sulfurflower, fescue

Timber production

Major management factors: Neuns—water erosion, very rapid runoff, slope, depth to rock, rock fragments, compaction hazard, limited available water capacity, plant competition, hazard of fire damage; Kindig—water erosion, very rapid runoff, slope, rock fragments, compaction hazard, limited available water capacity, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Maintaining the understory vegetation is essential in controlling erosion.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• The very rapid runoff rate can result in severe erosion if water is allowed to concentrate in bare areas, such as skid trails or roads.
• Using conventional harvesting methods is difficult because of the slope.
• The slope limits the use of wheeled and tracked equipment in skidding operations. End lining generally causes less disturbance of the soil.
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
• Depth to rock and rock fragments in the profile hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include sugar pine, ponderosa pine, and Douglas-fir.

Homesite development

Major management factors: Neuns—water erosion, slope, depth to rock; Kindig—water erosion, slope
Management considerations:
• Maintaining a permanent ground cover on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• During construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.
• If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.
• The limited depth to rock inhibits the filtering capacity of the leach fields or can prevent their placement. If the leach lines are placed too close to the bedrock, ground water may be contaminated by the effluent.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Neuns and Kindig—VIIe, nonirrigated
MLRA: 5
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Neuns—8R; Kindig—7R

264—Nikal-Chatterdown-Lava flows complex, 2 to 9 percent slopes

Setting

Landform: Lava plateaus
Elevation: 3,300 to 3,700 feet
Slope range: 2 to 9 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 48 to 52 degrees F
Frost-free period: 80 to 120 days

Composition

Nikal and similar soils: 50 percent
Chatterdown and similar soils: 25 percent
Lava flows: 15 percent
Contrasting inclusions: 10 percent

Characteristics of the Nikal Soil

Position on the landscape: Foot slopes
Parent material: Debris flow of andesite and ash deposited over basalt
Typical profile:
1 inch to 0—duff
0 to 18 inches—dark grayish brown sandy loam
18 to 28 inches—brown gravelly sandy loam
28 to 36 inches—brown very gravelly sandy loam
36 inches—fractured basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Chatterdown Soil

Position on the landscape: Toe slopes
Parent material: Volcanic ash outwash deposited over basalt
Typical profile:
0 to 15 inches—dark grayish brown fine sandy loam
15 to 30 inches—brown fine sandy loam
30 to 47 inches—dark yellowish brown fine sandy loam
47 to 63 inches—yellowish brown sandy loam
63 inches—fractured basalt
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Hazard of water erosion in bare areas: Low

Characteristics of the Lava Flows

• Lava flows consist of areas covered by geologically recent lava. They are characterized by sharp, jagged, broken blocks piled in tumbled heaps and have many crevices, sinkholes, and collapsed lava tubes. Most areas are vegetated by such plants as greenleaf manzanita and western serviceberry, but some areas are virtually devoid of vegetation.

Contrasting Inclusions

• Neer soils, which are 20 to 40 inches deep to weathered bedrock; near escarpments
• Ponto soils, which are more than 60 inches deep and have less than 35 percent rock fragments in the profile; on toe slopes
• Shasta soils, which are more than 60 inches deep and have less than 35 percent rock fragments in the profile; on toe slopes
• Soils that are similar to the Nikal soil but have less than 35 percent rock fragments in the profile; on foot slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Nikal soil

Main tree species: Ponderosa pine, incense cedar, lodgepole pine, white fir
Mean site index for stated species: Ponderosa pine—101
Dunning site class: 2
CACTOS site index: 65
Common understory plants: Greenleaf manzanita, whitethorn ceanothus, squawcarpet, bitter cherry, antelope bitterbrush, deerbrush

Woodland vegetation on the Chatterdown soil

Main tree species: Ponderosa pine, incense cedar, white fir
Mean site index for stated species: Ponderosa pine—113
Dunning site class: 1
CACTOS site index: 75
Common understory plants: Whitethorn ceanothus, antelope bitterbrush, greenleaf manzanita, deerbrush

Timber production

Major management factors: Nikal—compaction hazard, depth to rock, plant competition; Chatterdown—plant competition; Lava flows—depth to rock, rock fragments
Management considerations:
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.

• The routing of equipment should be planned before operations are begun.
• The Lava flows and the rock fragments on the surface tend to interfere with felling and yarding and with other uses of equipment. Harvesting should be planned so that vehicular traffic is limited in the areas of Lava flows.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir and ponderosa pine.

Interpretive Groups

Land capability classification: Nikal—IVe-4, nonirrigated; Chatterdown—IIIe-1, nonirrigated; Lava flows—VIII, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Nikal—7A; Chatterdown—9A

265—Nosoni loam, 0 to 5 percent slopes

Setting

Landform: Stream terraces and basin edges
Elevation: 3,100 to 4,800 feet
Slope range: 0 to 5 percent
Vegetation: Rushes, sedges, and grasses
Mean annual precipitation: 20 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Nosoni and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Nosoni Soil

Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 2 inches—dark grayish brown loam
2 to 8 inches—dark grayish brown sandy clay loam
8 to 80 inches—dark grayish brown, mottled grayish brown, and mottled brown sandy clay loam
Depth class: Very deep
Drainage class: Somewhat poorly drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Frequency of flooding: Occasional for brief periods from January through March
Depth to the water table: 12 to 24 inches from January through April
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Lava flow outcrops; on shoulders
• Pitvar soils, which are 40 to 60 inches deep to a hardpan and are clay throughout; in basins
• Soils that contain 20 to 50 percent gravel; near stream channels

Use and Management

Land use: Livestock grazing, irrigated crops, or homesite development

Livestock grazing

Common plants: Carex, rush, beardless wildrye, Kentucky bluegrass, alpine timothy, meadow foxtail
Major management factors: Flooding, high water table
Management considerations:
• Livestock operations can be impaired by flooding and the high water table in winter and spring.
• The flooding and the high water table should be considered when stand renovation or reestablishment is planned. If seeding is desired, species that are adapted to wetness should be considered.
• The high water table saturates the soil in winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.

Irrigated crops

Common crops: Alfalfa, grass-legume hay, barley, and wheat
Major management factors: Slope, flooding, high water table
Management considerations:
• Sprinkler irrigation is the most suitable method of applying water.
• The flooding and the high water table should be considered before any cropping is done or capital improvements are installed.
• The high water table limits the choice of crops and cultivars and increases the risk of winterkill.
• Careful management of irrigation is needed to avoid raising the water table.

Homesite development

Major management factors: Flooding, wetness, restricted permeability
Management considerations:
• Flooding can occur during the winter and early spring. The foundation should be taller than normal, or the buildings should be constructed at the highest elevations. Water should be intercepted by drainage ditches, or a drainage system should be developed around the foundation.
• Flooding can add water to the septic system. Diversion of floodwater helps to overcome this limitation.
• The high water table limits the absorption capacity of the leach field. A mounded leach field or other specialized leach field can help to overcome this limitation.
• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: IIIw-2, irrigated and nonirrigated
MLRA: 22
Prime farmland: Considered prime farmland in irrigated areas that are protected from flooding

266—Obie-Mounthat complex, 5 to 15 percent slopes

Setting

Landform: Mountains
Elevation: 4,500 to 6,300 feet
Slope range: 5 to 15 percent
Vegetation: Mixed conifers
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 39 to 44 degrees F
Mean annual soil temperature: 41 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Obie and similar soils: 40 percent
Mounthat and similar soils: 35 percent
Contrasting inclusions: 25 percent

Characteristics of the Obie Soil

Position on the landscape: Foot slopes
Parent material: Slope alluvium from andesitic debris flow
Typical profile:
1 inch to 0—duff
0 to 7 inches—dark brown very gravelly sandy loam
7 to 46 inches—brown very gravelly sandy loam
46 inches—weathered andesite
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Medium
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Mounthat Soil

Position on the landscape: Foot slopes
Parent material: Debris flow over residuum from nonvesicular material over vesicular andesitic basalt
Typical profile:
0 to 10 inches—dark brown and brown gravelly sandy loam
10 to 27 inches—brown very cobbly sandy loam
27 inches—weathered andesite
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Medium
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Bundora and Goulder soils, which are more than 60 inches deep and have an argillic horizon; on foot slopes
• Soils that are similar to the Mounthat soil but are less than 20 inches deep; on shoulders
• Soils that have less than 35 percent rock fragments; on toe slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Obie soil

Main tree species: White fir, incense cedar, ponderosa pine, California red fir, sugar pine, California black oak
Mean site index for stated species: White fir—71
Dunning site class: 1
CACTOS site index: 78

Common understory plants: Serviceberry, Sierra chinkapin, gooseberry, snowberry, princes pine, rose

Woodland vegetation on the Mounthat soil

Main tree species: White fir, ponderosa pine, incense cedar, California red fir, sugar pine, California black oak
Mean site index for stated species: White fir—69
Dunning site class: 1
CACTOS site index: 84
Common understory plants: Serviceberry, brackenfern, greenleaf manzanita, gooseberry, princes pine

Timber production

Major management factors: Obie—water erosion, plant competition; Mounthat—water erosion, depth to rock, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir, sugar pine, and ponderosa pine.

Interpretive Groups

Land capability classification: Obie—IVe-4, nonirrigated; Mounthat—IVs-7, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Obie—12F; Mounthat—11F

267—Obie-Mounthat complex, 15 to 30 percent slopes

Setting

Landform: Mountains
Elevation: 4,500 to 6,300 feet
Slope range: 15 to 30 percent
Vegetation: Conifers, shrubs, and grasses
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 39 to 44 degrees F
Mean annual soil temperature: 41 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Obie and similar soils: 45 percent
Mounthat and similar soils: 35 percent
Contrasting inclusions: 20 percent

Characteristics of the Obie Soil

Position on the landscape: Side slopes
Parent material: Slope alluvium from andesitic debris flow
Typical profile:
1 inch to 0—duff
0 to 7 inches—dark brown very gravelly sandy loam
7 to 46 inches—brown very gravelly sandy loam
46 inches—weathered andesite
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Mounthat Soil

Position on the landscape: Side slopes
Parent material: Debris flow over residuum from nonvesicular material over vesicular andesitic basalt
Typical profile:
0 to 10 inches—dark brown and brown gravelly sandy loam
10 to 27 inches—brown very cobbly sandy loam
27 inches—weathered andesite
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

• Bundora and Goulder soils, which are more than 60

inches deep and have an argillic horizon; on foot slopes
• Soils that are similar to the Mounthat soil but are less than 20 inches deep; on side slopes and shoulders

Use and Management

Land use: Timber production

Woodland vegetation on the Obie soil

Main tree species: White fir, incense cedar, California red fir, sugar pine
Mean site index for stated species: White fir—71
Dunning site class: 1
CACTOS site index: 78
Common understory plants: Serviceberry, snowberry, gooseberry, princes pine, Sierra chinkapin, rose

Woodland vegetation on the Mounthat soil

Main tree species: White fir, sugar pine, California black oak, incense cedar, ponderosa pine
Mean site index for stated species: White fir—69
Dunning site class: 1
CACTOS site index: 84
Common understory plants: Greenleaf manzanita, gooseberry, serviceberry, brackenfern, princes pine

Timber production

Major management factors: Obie—water erosion, plant competition; Mounthat—water erosion, depth to rock, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir, sugar pine, ponderosa pine, and California red fir.

Interpretive Groups

Land capability classification: Obie—IVe-4, nonirrigated; Mounthat—IVs-7, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Obie—12F; Mounthat—11F

268—Obie-Mounthat complex, 30 to 50 percent slopes

Setting

Landform: Mountains
Elevation: 5,000 to 6,500 feet
Slope range: 30 to 50 percent
Vegetation: Conifers, shrubs, and grasses
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 39 to 44 degrees F
Mean annual soil temperature: 41 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Obie and similar soils: 50 percent
Mounthat and similar soils: 35 percent
Contrasting inclusions: 15 percent

Characteristics of the Obie Soil

Position on the landscape: Back slopes
Parent material: Debris flow from andesitic basalt
Typical profile:
1 inch to 0—duff
0 to 20 inches—dark brown and brown very gravelly sandy loam
20 to 46 inches—brown very gravelly sandy loam
46 inches—weathered andesite
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: High

Characteristics of the Mounthat Soil

Position on the landscape: Side slopes
Parent material: Debris flow over residuum from

nonvesicular material over vesicular andesitic basalt
Typical profile:
1 inch to 0—duff
0 to 10 inches—dark brown and brown gravelly sandy loam
10 to 27 inches—brown very cobbly sandy loam
27 inches—weathered andesite
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: High

Contrasting Inclusions

• Rock outcrop; on shoulders and summits
• Soils that are similar to the Mounthat soil but are less than 40 inches deep to hard bedrock; on shoulders

Use and Management

Land use: Timber production

Woodland vegetation on the Obie soil

Main tree species: White fir, California red fir, sugar pine, incense cedar, ponderosa pine
Mean site index for stated species: White fir—71
Dunning site class: 1
CACTOS site index: 78
Common understory plants: Snowberry, gooseberry, rose, Sierra chinkapin, princes pine, serviceberry

Woodland vegetation on the Mounthat soil

Main tree species: White fir, incense cedar, California black oak, ponderosa pine, sugar pine
Mean site index for stated species: White fir—69
Dunning site class: 1
CACTOS site index: 84
Common understory plants: Greenleaf manzanita, serviceberry, brackenfern, gooseberry, princes pine

Timber production

Major management factors: Obie—water erosion, slope, plant competition, hazard of fire damage; Mounthat—water erosion, slope, depth to rock, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• Erosion can be severe during intense thunderstorms in the summer and warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• The slope limits the kinds of equipment that can be used in forest management.
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir.

Interpretive Groups

Land capability classification: Obie and Mounthat—VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Obie—12R; Mounthat—11R

269—Odas loam, 0 to 2 percent slopes

Setting

Landform: Flood plains
Elevation: 2,500 to 4,500 feet
Slope range: 0 to 2 percent
Vegetation: Rushes, sedges, and grasses
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 47 to 50 degrees F
Mean annual soil temperature: 48 to 51 degrees F
Frost-free period: 80 to 100 days

Composition

Odas and similar soils: 90 percent
Contrasting inclusions: 10 percent

Characteristics of the Odas Soil

Parent material: Alluvium and glacial outwash from volcanic ejecta and extrusive igneous rock
Typical profile:
0 to 8 inches—dark grayish brown loam
8 to 31 inches—dark grayish brown sandy loam
31 to 60 inches—grayish brown, light brownish gray, and gray sandy loam
Depth class: Very deep
Drainage class: Poorly drained
Slowest permeability class: Moderately rapid
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Very slow or slow
Depth to bedrock: More than 60 inches
Frequency of flooding: Rare for brief periods from December through April
Water table: At the surface to 18 inches below the surface from March through April; at a depth of 18 to 36 inches from May through February
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Soils that have a very gravelly substratum; next to stream channels
• Soils that have more than 18 percent clay; on foot slopes
• Stoner soils, which are more than 60 inches thick and have more than 35 percent rock fragments in the profile; on foot slopes

Use and Management

Land use: Pasture or homesite development

Pasture

Major management factors: Flooding, high water table
Management considerations:
• The hazard of flooding should be considered when stand renovation or reestablishment is planned.
• The high water table saturates the soil in winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
• The high water table limits the choice of plant species that can be used for seeding. Frequency, intensity, and duration of grazing affect the composition of the plant community.

Homesite development

Major management factors: Flooding, wetness
Management considerations:
• Flooding can occur during the winter and early spring. The foundation should be taller than normal, or the buildings should be constructed at the highest elevations. Water should be intercepted by drainage ditches, or a drainage system should be developed around the foundation.
• If septic tanks are used, the high water table limits the absorption capacity of the leach field. A mounded leach field or other specialized leach field can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: IIIw-2, irrigated and nonirrigated
MLRA: 22
Prime farmland: Considered prime farmland in drained areas that are protected from flooding

270—Oxendine-Lonkey complex, 2 to 9 percent slopes

Setting

Landform: Stream terraces
Elevation: 4,200 to 4,400 feet
Slope range: 2 to 9 percent
Vegetation: Sagebrush, grasses, and scattered juniper
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Oxendine and similar soils: 60 percent
Lonkey and similar soils: 20 percent
Contrasting inclusions: 20 percent

Characteristics of the Oxendine Soil

Position on the landscape: Toe slopes
Important surface feature: About 5 to 10 percent of the surface is covered with cobbles and stones.
Parent material: Alluvium from extrusive igneous rock and lacustrine deposits
Slope: 2 to 5 percent
Typical profile:
0 to 3 inches—grayish brown cobbly sandy clay loam
3 to 5 inches—brown sandy clay loam
5 to 7 inches—brown clay loam
7 to 9 inches—brown clay
9 to 12 inches—hardpan
12 inches—soft lacustrine tuff
Depth class: Shallow
Drainage class: Moderately well drained

Slowest permeability class: Slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Slow
Depth to hardpan: 9 to 20 inches
Depth to bedrock: 10 to 20 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Lonkey Soil

Position on the landscape: Foot slopes
Parent material: Colluvium from extrusive igneous rock
Slope: 5 to 9 percent
Typical profile:
0 to 8 inches—grayish brown loam
8 to 13 inches—brown clay loam
13 to 38 inches—yellowish brown clay loam
38 inches—weathered tuff
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Moderate
Surface runoff: Medium
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

- Bieber soils, which are less than 20 inches deep to a hardpan over alluvial material; in intermounds
- Modoc soils, which are 20 to 40 inches deep to a hardpan over alluvial material; on foot slopes
- Soils that are similar to the Lonkey soil but have more than 35 percent clay in the subsoil; on toe slopes

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants on the Oxendine soil: Low sagebrush, Thurber needlegrass, bluebunch wheatgrass
Common plants on the Lonkey soil: Mountain big sagebrush, bluebunch wheatgrass, rubber rabbitbrush, basin wildrye
Major management factors: Oxendine—cemented pan, frost heaving, limited available water capacity; Lonkey—water erosion
Management considerations:
- Maintaining a cover of vegetation, such as grass and brush, on about 15 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
- Fence construction on shallow soils requires special design.
- Frost heaving forces bunchgrasses and sagebrush above the soil surface. These conditions can reduce stand life and diversity. The effects of frost heaving can be reduced by using grazing management methods that maintain a thick cover of vegetation.
- Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Wood products

Major management factors: Oxendine—clayey subsoil; Lonkey—water erosion
Management considerations:
- Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 15 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- The high content of clay in the subsoil can reduce trafficability during wet periods. Roads should be graveled or surfaced for all-weather use.

Interpretive Groups

Land capability classification: Oxendine—VIIe, nonirrigated; Lonkey—IIIe-8, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Oxendine—Shallow Cobbly Loam, MAP 14-16 (21e); Lonkey—Diatomaceous Loam, MAP 14-16 (21e)

271—Oxendine-Sweagert complex, 0 to 5 percent slopes

Setting

Landform: Stream terraces
Elevation: 4,200 to 4,400 feet
Slope range: 0 to 5 percent
Vegetation: Grasses and low sagebrush
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 100 to 120 days

Composition

Oxendine and similar soils: 50 percent

Sweagert and similar soils: 30 percent
Contrasting inclusions: 20 percent

Characteristics of the Oxendine Soil

Position on the landscape: Intermounds
Parent material: Mixed alluvium from extrusive igneous rock
Typical profile:
0 to 2 inches—brown extremely gravelly sandy loam
2 to 10 inches—brown sandy clay loam
10 to 20 inches—hardpan
20 inches—soft lacustrine tuff
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Moderate
Surface runoff: Very slow or slow
Depth to hardpan: 10 to 14 inches
Depth to bedrock: 20 to 39 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Sweagert Soil

Position on the landscape: Mounds
Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 7 inches—gray loam
7 to 25 inches—gray clay loam
25 to 35 inches—pale brown and very pale brown clay loam
35 inches—hardpan
Depth class: Moderately deep
Drainage class: Moderately well drained
Slowest permeability class: Moderately slow in the upper part and slow in the lower part
Available water capacity: Moderate
Highest shrink-swell potential: High
Surface runoff: Slow
Depth to hardpan: 20 to 40 inches
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Bieber soils, which are less than 20 inches deep and have more than 35 percent clay in the subsoil; in intermounds
• Dotta soils, which are more than 60 inches deep; on toe slopes
• Lonkey soils, which are 20 to 40 inches deep to hard bedrock; on toe slopes
• Modoc soils, which are 20 to 40 inches deep to a hardpan; on mounds
• Soils that are similar to the Oxendine soil but are ponded; in the lower intermounds
• Soils that are similar to the Oxendine soil but have more than 35 percent rock fragments in the profile; near escarpments
• Soils that are similar to the Sweagert soil but have more than 35 percent clay throughout the subsoil; in intermounds
• Soils that have a hardpan at a depth of more than 40 inches; on foot slopes

Use and Management

Land use: Irrigated crops or livestock grazing

Irrigated crops

Common crops: Alfalfa, grain, hay, and potatoes
Major management factors: Oxendine—slope, cemented pan, depth to rock; Sweagert—slope, cemented pan
Management considerations:
• Sprinkler irrigation is the most suitable method of applying water.
• On soils that have a cemented pan, intensive management of irrigation water is needed to prevent the buildup of a perched water table. Ripping or subsoiling can permanently enhance the root environment.
• The depth to rock limits rooting depth, available water capacity, and the efficiency of irrigation.

Livestock grazing

Common plants on the Oxendine soil: Low sagebrush, bottlebrush squirreltail, needlegrass
Common plants on the Sweagert soil: Low sagebrush, bluebunch wheatgrass, needlegrass
Major management factors: Oxendine—cemented pan, frost heaving, limited available water capacity; Sweagert—none
Management considerations:
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• Frost heaving causes bunchgrasses and sagebrush to be forced up above the surface and leaves them exposed as pedestals. These conditions reduce the life of the stand. Seeding may be needed. Frost heaving can be reduced by maintaining a thick protective cover of vegetation.
• Because of the limited available water capacity, intensive grazing management is needed. Grazing frequency and duration can affect plant composition and vigor.

Interpretive Groups

Land capability classification: Oxendine—VIIs, irrigated and nonirrigated; Sweagert—IIIe-8, irrigated and nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Oxendine—Shallow Gravelly Loam, MAP 14-16 (21e); Sweagert—Loamy Mounds, MAP 14-16 (21e)

272—Oxendine-Sweagert complex, 2 to 5 percent slopes

Setting

Landform: Stream terraces
Elevation: 4,200 to 4,800 feet
Slope range: 2 to 5 percent
Vegetation: Grasses and low sagebrush
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Oxendine and similar soils: 60 percent
Sweagert and similar soils: 20 percent
Contrasting inclusions: 20 percent

Characteristics of the Oxendine Soil

Position on the landscape: Intermounds
Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 3 inches—brown very gravelly sandy loam
3 to 13 inches—brown and pink clay loam
13 to 20 inches—hardpan
20 inches—soft lacustrine tuff
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Moderate
Surface runoff: Very slow or slow
Depth to hardpan: 10 to 14 inches
Depth to bedrock: 20 to 39 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Sweagert Soil

Position on the landscape: Mounds
Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 3 inches—grayish brown gravelly sandy loam
3 to 6 inches—grayish brown loam
6 to 24 inches—grayish brown loam and brown and pale brown clay loam
24 to 26 inches—light yellowish brown gravelly clay
26 inches—hardpan
Depth class: Moderately deep
Drainage class: Moderately well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: High
Surface runoff: Slow
Depth to hardpan: 20 to 40 inches
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

- Adinot soils, which are less than 20 inches deep to hard bedrock; in intermounds
- Chalkford soils, which are more than 60 inches deep; on toe slopes
- Deven soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent clay in the subsoil; on escarpments
- Dotta soils, which are more than 60 inches deep; on toe slopes
- Soils that are similar to the Oxendine soil but are less than 10 inches deep; on foot slopes
- Soils that are similar to the Sweagert soil but are more than 40 inches deep to a hardpan; on toe slopes
- Sweagert soils that have a cobbly surface layer; on foot slopes

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants on the Oxendine soil: Low sagebrush, bottlebrush squirreltail, needlegrass
Common plants on the Sweagert soil: Low sagebrush, bluebunch wheatgrass, needlegrass
Major management factors: Oxendine—cemented pan, limited available water capacity; Sweagert—none
Management considerations:
- Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
- Fence construction on shallow soils requires special design.
- Because of the limited available water capacity, intensive management is needed. Frequency and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: Oxendine—VIIs, nonirrigated; Sweagert—IIIe-8, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Oxendine—Shallow Gravelly Loam, MAP 14-16 (21e); Sweagert—Loamy Mounds, MAP 14-16 (21e)

273—Oxendine-Sweagert complex, 2 to 9 percent slopes

Setting

Landform: Stream terraces
Elevation: 4,200 to 4,800 feet
Slope range: 2 to 9 percent
Vegetation: Grasses and low sagebrush
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Oxendine and similar soils: 50 percent
Sweagert and similar soils: 30 percent
Contrasting inclusions: 20 percent

Characteristics of the Oxendine Soil

Position on the landscape: Intermounds
Important surface feature: About 20 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Mixed alluvium from extrusive igneous rock
Typical profile:
0 to 6 inches—brown very cobbly sandy loam
6 to 11 inches—brown sandy clay loam
11 to 13 inches—brown very gravelly sandy clay loam
13 to 20 inches—hardpan
20 inches—soft lacustrine tuff
Depth class: Shallow
Drainage class: Moderately well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to hardpan: 10 to 14 inches
Depth to bedrock: 20 to 39 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Sweagert Soil

Position on the landscape: Mounds
Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 3 inches—grayish brown gravelly sandy loam
3 to 6 inches—grayish brown loam
6 to 24 inches—grayish brown loam and brown and pale brown clay loam
24 to 26 inches—light yellowish brown gravelly clay
26 inches—hardpan
Depth class: Moderately deep
Drainage class: Moderately well drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: High
Surface runoff: Slow
Depth to hardpan: 20 to 40 inches
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Adinot soils, which are less than 20 inches deep to hard bedrock and have less than 35 percent clay in the subsoil; on toe slopes
• Daphnedale soils, which are 20 to 40 inches deep to weathered bedrock and have more than 35 percent clay in the subsoil; on foot slopes
• Deven soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent clay in the subsoil; on foot slopes
• Dotta soils, which are more than 60 inches deep and have less than 35 percent clay in the subsoil; on toe slopes
• Soils that are similar to the Oxendine soil but are more than 14 inches deep to a hardpan; on toe slopes
• Soils that are similar to the Sweagert soil but are more than 40 inches deep to a hardpan; on foot slopes

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants on the Oxendine soil: Low sagebrush, Thurber needlegrass, bluebunch wheatgrass
Common plants on the Sweagert soil: Low sagebrush, bluebunch wheatgrass, needlegrass
Major management factors: Oxendine—cemented pan, rock fragments, limited available water capacity; Sweagert—none
Management considerations:
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.

• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: Oxendine—VIIs, nonirrigated; Sweagert—IIIe-8, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Oxendine—Shallow Cobbly Loam, MAP 14-16 (21e); Sweagert—Loamy Mounds, MAP 14-16 (21e)

274—Pastolla muck, 0 to 1 percent slopes

Setting

Landform: Basins
Elevation: 3,310 to 3,320 feet
Slope range: 0 to 1 percent
Vegetation: Tules, rushes, and sedges
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 50 to 52 degrees F
Mean annual soil temperature: 52 to 54 degrees F
Frost-free period: 120 to 130 days

Composition

Pastolla and similar soils: 90 percent
Contrasting inclusions: 10 percent

Characteristics of the Pastolla Soil

Parent material: Stratified alluvium from ash and lake deposits
Typical profile:
0 to 5 inches—very dark gray muck
5 to 10 inches—very dark gray mucky silt loam
10 to 24 inches—dark gray and dark grayish brown silt loam
24 to 31 inches—gray silty clay
31 to 44 inches—light gray loam to clay
44 to 60 inches—light gray coarse sandy loam; brittle
Depth class: Very deep
Drainage class: Very poorly drained
Slowest permeability class: Slow
Available water capacity: Very high
Salinity: 0 to 2 mmhos/cm from 0 to 60 inches
Sodicity (SAR): 0 to 1 from 5 to 60 inches
Highest shrink-swell potential: Very high
Surface runoff: Very slow
Depth to bedrock: More than 60 inches
Depth to cemented pan: 40 to 60 inches
Frequency of flooding: Frequent for very long periods from December through April
Water table: At the surface to 12 inches below the surface from October through April
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Organic soils near stream channels
• Pit soils, which are more than 60 inches deep and have clay throughout; near stream channels
• Soils having a subsoil that is fine textured throughout; near stream channels
• Whipp soils, which are 20 to 40 inches deep and have more than 35 percent clay in the subsoil; on foot slopes

Use and Management

Land use: Irrigated crops, pasture, or wetland wildlife habitat

Irrigated crops

Common crops: Grass-legume hay and wild rice
Major management factors: Soil blowing, flooding, high water table, slow permeability
Management considerations:
• Soil blowing can be controlled by keeping the soil rough, using emergency tillage, stripcropping, and establishing windbreaks.
• The hazard of flooding should be considered before any cropping is done or capital improvements are installed.
• The high water table can damage deep-rooted crops.
• Careful management of irrigation is needed to avoid raising the water table.
• Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.

Pasture

Major management factors: Soil blowing, flooding, high water table
Management considerations:
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.
• Livestock operations can be impaired by flooding and the high water table in winter and spring.
• The flooding and the high water table should be considered when stand renovation or reestablishment is planned.

• The high water table limits the choice of plant species and increases the likelihood that hydrophytic plants will invade.
• If seeding is desired, species that are adapted to wetness should be considered.
• The high water table saturates the soil in winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
• Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Wetland wildlife habitat

Management considerations:
• This unit can provide important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
• Drainage of wetlands in areas of this unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: IVw-2, irrigated and nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland in drained areas that are protected from flooding

275—Pastolla muck, drained, 0 to 2 percent slopes

Setting

Landform: Basins
Elevation: 3,310 to 3,320 feet
Slope range: 0 to 2 percent
Vegetation: Tules, rushes, and sedges
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 50 to 52 degrees F
Mean annual soil temperature: 52 to 54 degrees F
Frost-free period: 120 to 130 days

Composition

Pastolla and similar soils: 90 percent
Contrasting inclusions: 10 percent

Characteristics of the Pastolla Soil

Parent material: Stratified alluvium from ash and lacustrine deposits
Typical profile:
0 to 5 inches—very dark gray muck
5 to 19 inches—very dark gray mucky silt loam
19 to 22 inches—very dark gray silt loam
22 to 38 inches—light gray silty clay and loam
38 to 55 inches—gray clay and light gray loam
55 to 64 inches—light gray coarse sandy loam; brittle
Depth class: Very deep
Drainage class: Very poorly drained; drainage slightly altered
Slowest permeability class: Slow
Available water capacity: Very high
Salinity: 0 to 2 mmhos/cm from 0 to 64 inches
Sodicity (SAR): 0 to 1 from 5 to 64 inches
Highest shrink-swell potential: Very high
Surface runoff: Very slow
Depth to bedrock: More than 60 inches
Depth to cemented pan: 40 to 60 inches
Frequency of flooding: Frequent for very long periods from January through March
Depth to the water table: 6 to 18 inches from December through March
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Henhill soils, which have less than 35 percent clay in the subsoil and have a hardpan at a depth of 40 to 50 inches; on foot slopes
• Pit soils, which are more than 60 inches deep and have clay throughout; on the lower toe slopes
• Soils in which the subsoil has fine textures throughout; on the lower toe slopes
• Soils that have neutral reaction throughout; on toe slopes

Use and Management

Land use: Irrigated crops, pasture, homesite development, or wetland wildlife habitat

Irrigated crops

Common crops: Grass-legume hay and wild rice
Major management factors: Soil blowing, flooding, high water table, slow permeability
Management considerations:
• Soil blowing can be controlled by keeping the soil rough, using emergency tillage, stripcropping, and establishing windbreaks.
• The hazard of flooding should be considered before any cropping is done or capital improvements are installed.
• The high water table can damage deep-rooted crops.

• Careful management of irrigation is needed to avoid raising the water table.
• Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.

Pasture

Major management factors: Soil blowing, flooding, high water table
Management considerations:
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.
• Livestock operations can be impaired by flooding in winter and spring.
• The flooding and the high water table should be considered when stand renovation or reestablishment is planned.
• The high water table limits the choice of plant species and increases the likelihood that hydrophytic plants will invade.
• If seeding is desired, species that are adapted to wetness should be considered.
• The high water table saturates the soil in winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
• Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Homesite development

Major management factors: Flooding, wetness
Management considerations:
• Flooding can occur during winter and early spring. The foundation should be taller than normal, or the buildings should be constructed at the highest elevations. Water should be intercepted by drainage ditches, or a drainage system should be developed around the foundation.
• Because of wetness in the soil profile in winter and early spring, a drainage system should be developed around the foundation.
• Flooding can add water to the septic system. Diversion of floodwater can help to overcome this limitation.
• The high water table limits the absorption capacity of the leach field. A mounded leach field or other specialized leach field can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Wetland wildlife habitat

Management considerations:
• This unit can provide important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
• Drainage of wetlands in areas of this unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: IVw-2, irrigated and nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland in drained areas that are protected from flooding

276—Pastolla mucky silt loam, channeled, 0 to 2 percent slopes

Setting

Landform: Basins
Elevation: 4,140 to 4,180 feet
Slope range: 0 to 2 percent
Vegetation: Tules, rushes, and sedges
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 50 to 52 degrees F
Frost-free period: 100 to 120 days

Composition

Pastolla and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Pastolla Soil

Parent material: Stratified alluvium from ash and lacustrine deposits
Typical profile:
0 to 5 inches—dark gray mucky silt loam
5 to 22 inches—very dark grayish brown silt loam and brown very fine sandy loam
22 to 34 inches—dark grayish brown and very dark gray silty clay
34 to 64 inches—stratified very dark gray silty clay and clay to yellowish brown loam
Depth class: Very deep
Drainage class: Very poorly drained

Slowest permeability class: Slow
Available water capacity: Very high
Salinity: 0 to 2 mmhos/cm from 0 to 64 inches
Sodicity (SAR): 0 to 1 from 5 to 64 inches
Highest shrink-swell potential: Very high
Surface runoff: Very slow or slow
Depth to bedrock: More than 60 inches
Frequency of flooding: Occasional for long periods from January through March
Depth to the water table: 12 to 24 inches from December through March
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Henhill soils, which are more than 60 inches deep and have an argillic horizon; on foot slopes
• Sweagert soils, which are 20 to 40 inches deep and have an argillic horizon; on toe slopes and mounds

Use and Management

Land use: Wetland wildlife habitat, irrigated crops, or pasture

Irrigated crops

Common crops: Barley
Major management factors: Soil blowing, flooding, high water table, slow permeability
Management considerations:
• Soil blowing can be controlled by keeping the soil rough, using emergency tillage, stripcropping, and establishing windbreaks.
• The hazard of flooding should be considered before any cropping is done or capital improvements are installed.
• The high water table can damage deep-rooted crops.
• Careful management of irrigation is needed to avoid raising the water table.
• Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.

Pasture

Major management factors: Soil blowing, flooding, high water table
Management considerations:
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.
• Livestock operations can be impaired by flooding in winter and spring.
• The high water table saturates the soil in winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
• The flooding and the high water table should be considered when stand renovation or reestablishment is planned.
• The high water table limits the choice of plant species and increases the likelihood that hydrophytic plants will invade.
• If seeding is desired, species that are adapted to a high water table should be considered.
• Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Wetland wildlife habitat

Management considerations:
• This unit can provide important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
• Drainage of wetlands in areas of this unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: IVw-2, irrigated and nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland

277—Patburn loam, 0 to 2 percent slopes

Setting

Landform: Stream terraces
Elevation: 4,000 to 4,700 feet
Slope range: 0 to 2 percent
Vegetation: Silver sagebrush and grasses
Mean annual precipitation: 16 to 25 inches
Mean annual air temperature: 45 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Patburn and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Patburn Soil

Parent material: Alluvium from extrusive igneous rock

Typical profile:
0 to 2 inches—mottled dark grayish brown loam
2 to 13 inches—mottled grayish brown and mottled brown clay loam
13 to 32 inches—mottled brown clay
32 to 50 inches—mottled light brown loam and mottled light brown clay loam
50 to 72 inches—mottled light brown sandy clay loam
Depth class: Very deep
Drainage class: Somewhat poorly drained
Slowest permeability class: Slow
Available water capacity: High
Highest shrink-swell potential: High
Surface runoff: Very slow or slow
Depth to claypan: 10 to 25 inches
Depth to bedrock: More than 60 inches
Frequency of flooding: Occasional for long periods from January through May
Depth to the water table: 24 to 60 inches from December through May
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Burman soils, which are 20 to 40 inches deep to a hardpan and have an abrupt clay increase; on toe slopes
• Channeled areas
• Lasvar soils, which are 20 to 40 inches deep to a hardpan and have clay throughout; on the lower toe slopes
• Areas in which 10 to 30 percent of the surface is covered by cobbles; on foot slopes
• Swanberger soils, which are ponded for short periods; on the lower toe slopes

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants: Silver sagebrush, meadow barley, beardless wildrye, bluegrass
Major management factors: Flooding, high water table
Management considerations:
• Livestock operations can be impaired by flooding and the high water table in winter and spring.
• The flooding and the high water table should be considered when stand renovation or reestablishment is planned.
• The high water table enhances forage production and extends the green feed period.

Interpretive Groups

Land capability classification: IIIw-3, irrigated and nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Range site: Loamy Fan, MAP 18+ (22d)

278—Patburn clay loam, 0 to 2 percent slopes

Setting

Landform: Stream terraces and drainageways
Elevation: 3,400 to 4,000 feet
Slope range: 0 to 2 percent
Vegetation: Grasses and silver sagebrush
Mean annual precipitation: 16 to 18 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 50 to 52 degrees F
Frost-free period: 120 to 130 days

Composition

Patburn and similar soils: 80 percent
Contrasting inclusions: 20 percent

Characteristics of the Patburn Soil

Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 2 inches—dark grayish brown clay loam
2 to 24 inches—dark grayish brown and dark brown clay
24 to 65 inches—brown sandy clay loam
Depth class: Very deep
Drainage class: Somewhat poorly drained
Slowest permeability class: Slow
Available water capacity: High
Highest shrink-swell potential: High
Surface runoff: Very slow or slow
Depth to claypan: 10 to 25 inches
Depth to bedrock: More than 60 inches
Frequency of flooding: Occasional for long periods from January through May
Depth to the water table: 24 to 60 inches from December through May
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Jellycamp soils, which are less than 20 inches deep to a hardpan over hard bedrock; on toe slopes
• Lassen soils, which are 20 to 40 inches deep to hard bedrock; in intermounds

• Ravendale soils, which are 40 to 60 inches deep to weathered bedrock; in intermounds

Use and Management

Land use: Irrigated crops or livestock grazing

Irrigated crops

Common crops: Alfalfa, grass-legume hay, barley, and wheat
Major management factors: Depth to the claypan, flooding, high water table, slow permeability
Management considerations:
• Chiseling or subsoiling of the claypan can provide temporary benefits from improved water and air movement and root penetration.
• Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.
• The hazard of flooding should be considered before any cropping is done or capital improvements are installed.
• The high water table limits the choice of crops and cultivars and increases the risk of winterkill.
• The high water table limits the suitability for deep-rooted crops or can cause crop damage.
• Careful management of irrigation is needed to avoid raising the water table.

Livestock grazing

Common plants: Beardless wildrye, silver sagebrush, bluegrass, meadow barley
Major management factors: Flooding, high water table
Management considerations:
• Livestock operations can be impaired by flooding in winter and spring.
• The hazard of flooding should be considered when stand renovation or reestablishment is planned.
• The high water table enhances forage production and extends the green feed period.
• If seeding is desired, species that are adapted to very moist soil conditions should be selected.

Interpretive Groups

Land capability classification: IIw-3, irrigated, and IIIw-3, nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland in drained areas that are protected from flooding
Range site: Loamy Fan, MAP 18+ (22d)

279—Pit silty clay, drained, 0 to 2 percent slopes

Setting

Landform: Basins
Elevation: 4,100 to 4,200 feet
Slope range: 0 to 2 percent
Vegetation: Silver sagebrush and grasses
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 52 to 54 degrees F
Frost-free period: 100 to 120 days

Composition

Pit and similar soils: 90 percent
Contrasting inclusions: 10 percent

Characteristics of the Pit Soil

Parent material: Fine textured alluvium from extrusive and basic igneous rock
Typical profile:
0 to 4 inches—dark gray silty clay
4 to 40 inches—dark gray clay
40 to 45 inches—light brownish gray silty clay loam
45 to 60 inches—light brownish gray silt loam
Depth class: Very deep
Drainage class: Poorly drained under natural conditions; drainage has been altered
Slowest permeability class: Slow
Available water capacity: Very high
Salinity: 0 to 2 mmhos/cm from 0 to 4 inches; 0 to 4 mmhos/cm from 4 to 60 inches
Sodicity (SAR): 20 to 30 from 0 to 4 inches; 15 to 25 from 4 to 40 inches; 10 to 20 from 40 to 45 inches; 5 to 15 from 45 to 60 inches
Highest shrink-swell potential: High
Surface runoff: Very slow
Depth to bedrock: More than 60 inches
Frequency of flooding: Frequent for long periods from January through May
Depth to the water table: 60 to 72 inches from December through May
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Cupvar soils, which are 20 to 40 inches deep to a hardpan; on toe slopes
• Henhill soils, which are more than 60 inches deep and have less than 35 percent clay in the subsoil; on foot slopes
• Pastolla soils, which are more than 60 inches deep

and have medial material over a subsoil having more than 35 percent clay; on toe slopes

Use and Management

Land use: Irrigated crops, pasture, homesite development, or wetland wildlife habitat

Irrigated crops

Common crops: Grass-legume hay and wild rice
Major management factors: Flooding, sodicity and salinity, slow permeability
Management considerations:
• The hazard of flooding should be considered before any cropping is done or capital improvements are installed.
• Sodicity and salinity can be overcome by toxic salt reduction, application of soil amendments, or both.
• The high salt levels and the high pH increase cropping limitations. This unit has potential for the development of wetland wildlife habitat.
• Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.

Pasture

Major management factors: Flooding, sodicity, shrink-swell
Management considerations:
• Livestock operations can be impaired by flooding in winter and spring.
• The flooding, sodicity, and shrink-swell potential should be considered when stand renovation or reestablishment is planned. If seeding is desired, species that are adapted to these conditions should be selected.
• Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Homesite development

Major management factors: Flooding, shrink-swell, restricted permeability
• Flooding can occur during the winter and early spring. The foundation should be taller than normal, or the buildings should be constructed at the highest elevations. Water should be intercepted by drainage ditches, or a drainage system should be developed around the foundation.
• The effects of shrinking and swelling can be minimized by using proper engineering designs or backfilling with material that has a low shrink-swell potential.
• Flooding can add water to the septic system. Diversion of floodwater helps to overcome this limitation.
• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Wetland wildlife habitat

Management considerations:
• This unit can provide important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
• Drainage of wetlands in areas of this unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: IVw-2, irrigated and nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland only in drained areas

280—Pit silty clay, frequently flooded, 0 to 1 percent slopes

Setting

Landform: Basins
Elevation: 4,100 to 4,200 feet
Slope range: 0 to 1 percent
Vegetation: Silver sagebrush and grasses
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 50 to 52 degrees F
Mean annual soil temperature: 52 to 54 degrees F
Frost-free period: 100 to 120 days

Composition

Pit and similar soils: 90 percent
Contrasting inclusions: 10 percent

Characteristics of the Pit Soil

Parent material: Fine textured alluvium from extrusive and basic igneous rock
Typical profile:
0 to 4 inches—dark gray silty clay
4 to 43 inches—dark gray and gray clay

43 to 64 inches—very pale brown silt loam
Depth class: Very deep
Drainage class: Poorly drained
Slowest permeability class: Slow
Available water capacity: Very high
Highest shrink-swell potential: High
Surface runoff: Ponded
Depth to bedrock: More than 60 inches
Frequency of flooding: Frequent for long periods from December through March
Depth to the water table: 24 to 36 inches from December through March; 36 to 60 inches from April through July; 60 to 72 inches from August through October
Kind of water table: Apparent
Ponding: 6 inches above the surface for long periods from December through February
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Longbilly soils, which are more than 60 inches deep and have a natric horizon; on foot slopes
• The very poorly drained Pastolla soils, which are more than 60 inches deep and have medial material over clayey material; on toe slopes
• Soils that have a duripan at a depth of 40 to 60 inches; on toe slopes

Use and Management

Land use: Livestock grazing or wetland wildlife habitat

Livestock grazing

Common plants: Carex, Baltic rush, bulrush, beardless wildrye
Major management factors: Flooding, high water table, ponding, shrink-swell
Management considerations:
• Livestock operations can be impaired by flooding, the high water table, and ponding in winter and spring.
• The hazard of flooding should be considered when stand renovation or reestablishment is planned.
• The high water table enhances forage production and extends the green feed period.
• If seeding is desired, species that are adapted to a high water table and a high shrink-swell potential should be considered.
• Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Wetland wildlife habitat

Management considerations:
• This unit can provide important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
• Drainage of wetlands in areas of this unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: IVw-2, irrigated and nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland in irrigated areas that are protected from flooding

281—Pits-Dumps complex

Setting

Landform: Lava plateaus
Elevation: 3,500 to 4,000 feet
Slope range: 0 to 2 percent
Vegetation: Grasses, scattered Oregon white oak, conifers, and shrubs
Mean annual precipitation: 25 to 40 inches
Mean annual air temperature: 45 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 50 to 100 days

Composition

Pits and similar soils: 60 percent
Dumps: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Pits

• Pits consist of borrow pits from which sand, gravel, cinders, or soil has been removed.

Characteristics of Dumps

• Dumps are landfill dumps of household wastes and sawmill wastes. Drainage, permeability, erosion hazard, runoff, and available water capacity are variable.

Inclusions

• Typically, small areas of surrounding soils are included in mapping.

282—Pittville sandy loam, 0 to 5 percent slopes

Setting

Landform: Stream terraces
Elevation: 3,250 to 3,550 feet
Slope range: 0 to 5 percent
Vegetation: Grasses and big sagebrush
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 50 to 52 degrees F
Mean annual soil temperature: 52 to 54 degrees F
Frost-free period: 120 to 130 days

Composition

Pittville and similar soils: 90 percent
Contrasting inclusions: 10 percent

Characteristics of the Pittville Soil

Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 9 inches—brown sandy loam
9 to 41 inches—grayish brown, brown, and light yellowish brown sandy clay loam
41 to 84 inches—light yellowish brown loamy sand and light brownish gray sand
84 inches—hardpan
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Dudgen soils, which are less than 20 inches deep to a hardpan; in intermounds
• Esperanza soils, which have more than 35 percent clay in the subsoil; on toe slopes
• Graven soils, which are 20 to 40 inches deep to a hardpan; on mounds
• Pit soils, which have clay throughout; on toe slopes
• Soils that have a high water table; near stream channels

Use and Management

Land use: Irrigated crops, pasture, or homesite development

Irrigated crops

Common crops: Alfalfa, grass-legume hay, barley, wheat, potatoes, and strawberries
Major management factors: Slope, soil blowing
Management considerations:
• Sprinkler irrigation is the most suitable method of applying water.
• Soil blowing can be controlled by keeping the soil rough, using emergency tillage, stripcropping, and establishing windbreaks.

Pasture

Major management factors: Soil blowing
Management considerations:
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.

Homesite development

Major management factors: Shrink-swell, restricted permeability
Management considerations:
• The effects of shrinking and swelling can be minimized by using proper engineering designs or backfilling with material that has a low shrink-swell potential.
• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: IIc-1, irrigated and nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland only in irrigated areas

283—Pittville sandy loam, 5 to 9 percent slopes

Setting

Landform: Stream terraces
Elevation: 3,250 to 3,550 feet
Slope range: 5 to 9 percent
Vegetation: Grasses and big sagebrush
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 50 to 52 degrees F
Mean annual soil temperature: 52 to 54 degrees F
Frost-free period: 120 to 130 days

Composition

Pittville and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Pittville Soil

Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 9 inches—brown sandy loam
9 to 41 inches—grayish brown, brown, and light yellowish brown sandy clay loam
41 to 84 inches—stratified light yellowish brown loamy sand and light brownish gray sand
84 inches—hardpan
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Esperanza soils, which are 40 to 60 inches deep to a hardpan; on toe slopes
• Pit soils, which are more than 60 inches deep and have clay throughout; on toe slopes
• Soils that have a high water table; near stream channels

Use and Management

Land use: Irrigated crops, pasture, or homesite development

Irrigated crops

Common crops: Hay, grain, potatoes, and strawberry plants
Major management factors: Slope, soil blowing
Management considerations:
• Sprinkler irrigation is the most suitable method of applying water.
• Soil blowing can be controlled by keeping the soil rough, using emergency tillage, stripcropping, and establishing windbreaks.

Pasture

Major management factors: Soil blowing
Management considerations:
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.

Homesite development

Major management concerns: None
Management considerations:
• If the density of homesites increases or regulations change, a community disposal system should be considered.

Interpretive Groups

Land capability classification: IIIe-1, irrigated, and IVe-1, nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland only in irrigated areas

284—Pittville sandy loam, 9 to 15 percent slopes

Setting

Landform: Stream terraces
Elevation: 3,250 to 3,550 feet
Slope range: 9 to 15 percent
Vegetation: Grasses and big sagebrush
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 50 to 52 degrees F
Mean annual soil temperature: 52 to 54 degrees F
Frost-free period: 120 to 130 days

Composition

Pittville and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Pittville Soil

Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 9 inches—brown sandy loam
9 to 41 inches—grayish brown, brown, and light yellowish brown sandy clay loam
41 to 84 inches—stratified light yellowish brown loamy sand and light brownish gray sand
84 inches—hardpan
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Esperanza soils, which are 40 to 60 inches deep to a hardpan and have more than 35 percent clay in the subsoil; on toe slopes
• The poorly drained Pit soils, which have clay throughout; on the lower toe slopes
• Soils that have a water table at a depth of less than 60 inches; near stream channels

Use and Management

Land use: Irrigated crops, pasture, or homesite development

Irrigated crops

Common crops: Hay, grain, potatoes, and strawberry plants
Major management factors: Slope, water erosion, soil blowing
Management considerations:
• Maintaining a cover of vegetation, such as crop residue and grass, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• During periods when the soil is bare, erosion can be controlled by properly managing crop residue or planting a cover crop.
• Limiting tillage for seedbed preparation and weed control helps to control runoff and erosion.
• Sprinkler irrigation is the most suitable method of applying water.
• Soil blowing can be controlled by keeping the soil rough, using emergency tillage, stripcropping, and establishing windbreaks.

Pasture

Major management factors: Water erosion, soil blowing
Management considerations:
• Maintaining a cover of vegetation, such as mulch and grass, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.

Homesite development

Major management concerns: None
Management considerations:
• If the density of homesites increases or regulations change, a community disposal system should be considered.

Interpretive Groups

Land capability classification: IIIe-1, irrigated, and IVe-1, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland

285—Pittville sandy loam, 15 to 30 percent slopes

Setting

Landform: Stream terraces
Elevation: 3,250 to 3,550 feet
Slope range: 15 to 30 percent
Vegetation: Grasses and big sagebrush
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 50 to 52 degrees F
Mean annual soil temperature: 52 to 54 degrees F
Frost-free period: 120 to 130 days

Composition

Pittville and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Pittville Soil

Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 9 inches—brown sandy loam
9 to 41 inches—grayish brown, brown, and light yellowish brown sandy clay loam
41 to 84 inches—stratified light yellowish brown loamy sand and light brownish gray sand
84 inches—hardpan
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: High

Contrasting Inclusions

• Esperanza soils, which are 40 to 60 inches deep to a hardpan and have more than 35 percent clay in the subsoil; on toe slopes
• Soils that are less than 40 inches deep to tuff; on shoulders

Use and Management

Land use: Irrigated crops, pasture, or homesite development

Irrigated crops

Common crops: Hay, grain, potatoes, and strawberry plants
Major management factors: Slope, water erosion, soil blowing

Management considerations:
• Maintaining a cover of vegetation, such as crop residue and grass, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• During periods when the soil is bare, erosion can be controlled by properly managing crop residue or planting a cover crop.
• Water erosion can be controlled by seeding in early fall, applying a system of conservation tillage, and constructing diversions and grassed waterways.
• Limiting tillage for seedbed preparation and weed control helps to control runoff and erosion.
• All tillage should be on the contour or across the slope.
• Sprinkler irrigation is the most suitable method of applying water.
• The slope can affect the safe use of cropping equipment.
• Soil blowing can be controlled by keeping the soil rough, using emergency tillage, stripcropping, and establishing windbreaks.

Pasture

Major management factors: Water erosion, soil blowing
Management considerations:
• Maintaining a cover of vegetation, such as mulch and grass, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.

Homesite development

Major management factors: Water erosion, slope
Management considerations:
• Maintaining a permanent ground cover on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• During construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.
• If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.
• If the density of homesites increases or regulations change, a community disposal system should be considered.

Interpretive Groups

Land capability classification: IVe-1, irrigated and nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland

286—Ponto sandy loam, 2 to 15 percent slopes

Setting

Landform: Stream terraces
Elevation: 3,100 to 3,800 feet
Slope range: 2 to 15 percent
Vegetation: Mixed conifers, oaks, and shrubs
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 47 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Ponto and similar soils: 90 percent
Contrasting inclusions: 10 percent

Characteristics of the Ponto Soil

Parent material: Volcanic ash
Typical profile:
0 to 8 inches—dark brown and yellowish brown sandy loam
8 to 45 inches—yellowish brown and light yellowish brown sandy loam
45 to 60 inches—very pale brown stony sandy loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Neer soils, which are 20 to 40 inches deep to weathered bedrock; on foot slopes
• Shastina soils, which are more than 60 inches deep and have more than 35 percent rock fragments in the profile; on foot slopes
• Soils that have more than 35 percent rock fragments in the profile; on foot slopes
• Wyntoon soils, which are more than 60 inches deep and have an argillic horizon; on toe slopes

Use and Management

Land use: Timber production or homesite development

Woodland vegetation

Main tree species: Ponderosa pine, incense cedar, white fir, Douglas-fir, sugar pine
Mean site index for stated species: Ponderosa pine—137; white fir—87
Dunning site class: 1A
CACTOS site index: 95
Common understory plants: Greenleaf manzanita, Sierra chinkapin, whitethorn ceanothus, deerbrush, squawcarpet, snowbrush ceanothus, tanoak, bitter cherry, antelope bitterbrush

Timber production

Major management factors: Water erosion, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir and ponderosa pine.

Homesite development

Major management factors: Water erosion, slope, moderately rapid permeability
Management considerations:
• Maintaining a permanent ground cover on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• During construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.
• If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.
• The moderately rapid permeability can affect the absorption capacity of the leach fields. Enlarging the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: IIIe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 15A

287—Ponto-Neer, dark surface, complex, 15 to 30 percent slopes

Setting

Landform: Lava plateaus and mountains
Elevation: 3,000 to 4,500 feet
Slope range: 15 to 30 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Mean annual soil temperature: 48 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Ponto and similar soils: 55 percent
Neer and similar soils: 30 percent
Contrasting inclusions: 15 percent

Characteristics of the Ponto Soil

Position on the landscape: Foot slopes
Parent material: Volcanic ash
Typical profile:
1 inch to 0—duff
0 to 6 inches—dark brown sandy loam
6 to 62 inches—brown sandy loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate

Characteristics of the Neer Soil

Position on the landscape: Side slopes
Parent material: Tephra
Typical profile:
1 inch to 0—duff
0 to 10 inches—dark brown gravelly sandy loam
10 to 24 inches—dark brown very gravelly sandy loam
24 to 39 inches—brown very gravelly sandy loam
39 inches—weathered andesite
Depth class: Moderately deep
Drainage class: Well drained

Slowest permeability class: Rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

• Gasper soils, which have more than 35 percent rock fragments and less than 35 percent clay in the subsoil and have an argillic horizon
• Scarface soils, which have less than 35 percent clay in the subsoil and have an argillic horizon; on foot slopes
• Soils that are similar to the Neer soil but are less than 20 inches deep; on shoulders
• Soils that are similar to the Ponto soil but have more than 35 percent coarse fragments; on side slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Ponto soil

Main tree species: White fir, ponderosa pine, incense cedar, Douglas-fir, sugar pine
Mean site index for stated species: White fir—87; ponderosa pine—137
Dunning site class: 1
CACTOS site index: 75
Common understory plants: Greenleaf manzanita, squawcarpet, Sierra chinkapin, deerbrush, snowbrush ceanothus, bitter cherry

Woodland vegetation on the Neer soil

Main tree species: White fir, ponderosa pine, incense cedar, Douglas-fir, sugar pine, California black oak
Mean site index for stated species: White fir—78; ponderosa pine—105
Dunning site class: 2
CACTOS site index: 65
Common understory plants: Serviceberry, snowbrush ceanothus, needlegrass, greenleaf manzanita, Sierra chinkapin, antelope bitterbrush

Timber production

Major management factors: Ponto—water erosion, plant competition; Neer—water erosion, depth to rock, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include ponderosa pine.

Interpretive Groups

Land capability classification: Ponto and Neer—IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Ponto—15A; Neer—13F

288—Ponto-Wyntoon complex, 2 to 15 percent slopes

Setting

Landform: Fan terraces
Elevation: 3,200 to 4,300 feet
Slope range: 2 to 15 percent
Vegetation: Mixed conifers, oaks, and shrubs
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 47 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Ponto and similar soils: 50 percent
Wyntoon and similar soils: 35 percent
Contrasting inclusions: 15 percent

Characteristics of the Ponto Soil

Position on the landscape: Toe slopes
Parent material: Volcanic ash
Typical profile:
0 to 8 inches—dark brown and yellowish brown sandy loam
8 to 45 inches—yellowish brown and light yellowish brown sandy loam
45 to 60 inches—very pale brown stony sandy loam
Depth class: Very deep

Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Wyntoon Soil

Position on the landscape: Foot slopes
Parent material: Alluvium from extrusive igneous rock
Typical profile:
1 inch to 0—duff
0 to 9 inches—brown sandy loam
9 to 25 inches—brown loam
25 to 49 inches—light brown silty clay loam and clay loam
49 to 74 inches—pink and reddish yellow clay
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Very high
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

- Kindig soils, which are 20 to 40 inches deep to weathered bedrock and have more than 35 percent rock fragments in the profile; on back slopes
- Neer soils, which are 20 to 40 inches deep to weathered bedrock and have more than 35 percent rock fragments in the profile; on back slopes
- Neuns soils, which are 20 to 40 inches deep to hard bedrock and have more than 35 percent rock fragments in the profile; on back slopes

Use and Management

Land use: Timber production or homesite development

Woodland vegetation on the Ponto soil

Main tree species: White fir, Douglas-fir, sugar pine, ponderosa pine, incense cedar
Mean site index for stated species: White fir—87; ponderosa pine—137
Dunning site class: 1A
CACTOS site index: 95
Common understory plants: Greenleaf manzanita, Sierra chinkapin, whitethorn ceanothus, deerbrush, squawcarpet, snowbrush ceanothus, tanoak, bitter cherry, antelope bitterbrush

Woodland vegetation on the Wyntoon soil

Main tree species: Jeffrey pine, ponderosa pine, incense cedar, Douglas-fir, white fir, California black oak
Mean site index for stated species: Douglas-fir—143; Jeffrey pine and ponderosa pine—113; white fir—75
Dunning site class: 1
CACTOS site index: 80
Common understory plants: Western serviceberry, greenleaf manzanita, whitethorn ceanothus, deerbrush, squawcarpet, tanoak, needlegrass

Timber production

Major management factors: Ponto—water erosion, plant competition; Wyntoon—water erosion, compaction hazard, plant competition
Management considerations:
- Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- Roads and landings can be protected from erosion by constructing water bars.
- The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
- Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
- Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
- Trees suitable for planting include white fir and ponderosa pine.

Homesite development

Major management factors: Water erosion, slope, restricted permeability
Management considerations:
- Maintaining a permanent ground cover on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- During construction, all bare ground should be mulched. Establishing a ground cover helps to

prevent excessive erosion during periods of high rainfall.

• If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.

• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.

• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Ponto—IIIe-4, nonirrigated; Wyntoon—IIIe-3, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Ponto—15A; Wyntoon—9A

289—Quaking-Kephart complex, 15 to 30 percent slopes

Setting

Landform: Lava plateaus
Elevation: 4,400 to 4,750 feet
Slope range: 15 to 30 percent
Vegetation: Ponderosa pine, antelope bitterbrush, and grasses
Mean annual precipitation: 16 to 25 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Quaking and similar soils: 60 percent
Kephart and similar soils: 30 percent
Contrasting inclusions: 10 percent

Characteristics of the Quaking Soil

Position on the landscape: Side slopes
Parent material: Tephra deposited over basaltic lava flows
Typical profile:
1 inch to 0—duff
0 to 3 inches—gray pumiceous very gravelly loamy coarse sand
3 to 7 inches—white pumiceous extremely gravelly sand
7 to 14 inches—light brown gravelly coarse sandy loam
14 to 21 inches—light brown very gravelly sandy loam
21 to 32 inches—light yellowish brown extremely gravelly sandy clay loam
32 to 64 inches—light yellowish brown extremely gravelly coarse sandy loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Kephart Soil

Position on the landscape: Side slopes
Parent material: Tephra over basaltic lava
Typical profile:
3 inches to 0—duff
0 to 3 inches—dark grayish brown pumiceous very gravelly loamy coarse sand
3 to 8 inches—light brownish gray extremely gravelly coarse sand
8 to 19 inches—brown coarse sandy loam
19 to 25 inches—brown sandy loam
25 to 68 inches—brown, yellowish brown, and light yellowish brown sandy clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Lava flow outcrops; on shoulders

• Loveness soils, which have less than 35 percent clay in the subsoil and have a light colored surface layer

• Medici soils, which have medial over loamy-skeletal material and do not have an argillic horizon; on back slopes

• Medlake soils, which have pumiceous over medial material and do not have an argillic horizon; on foot slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Quaking soil

Main tree species: Jeffrey pine, ponderosa pine, incense cedar
Mean site index for stated species: Jeffrey pine and ponderosa pine—89
Dunning site class: 3
CACTOS site index: 63
Common understory plants: Greenleaf manzanita, antelope bitterbrush, bloomer goldenbush, squirreltail, needlegrass

Woodland vegetation on the Kephart soil

Main tree species: Ponderosa pine, incense cedar
Mean site index for stated species: Ponderosa pine—91
Dunning site class: 3
CACTOS site index: 64
Common understory plants: Greenleaf manzanita, antelope bitterbrush, squirreltail, bloomer goldenbush

Timber production

Major management factors: Quaking—pumiceous material, water erosion, coarse texture, compaction hazard, limited available water capacity, plant competition, hazard of fire damage; Kephart—pumiceous material, water erosion, coarse texture, compaction hazard, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 30 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The extremely porous nature of the pumiceous material allows maximum root development for seedlings and tree growth.
• Roads and landings can be protected from erosion by constructing water bars.
• Water bars constructed with pumice can wash out during periods of intense thunderstorms. The water bars should be constructed with finer textured soil material, or the roads should be built with rolled grades for erosion control.
• The coarse texture throughout the profile hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include Jeffrey pine and ponderosa pine.

Interpretive Groups

Land capability classification: Quaking—IVs-4, nonirrigated; Kephart—IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Quaking—6S; Kephart—6F

290—Ravendale silty clay, 0 to 2 percent slopes

Setting

Landform: Basins
Elevation: 4,100 to 5,000 feet
Slope range: 0 to 2 percent
Vegetation: Silver sagebrush and grasses
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 40 to 48 degrees F
Mean annual soil temperature: 49 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Ravendale and similar soils: 90 percent
Contrasting inclusions: 10 percent

Characteristics of the Ravendale Soil

Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 16 inches—grayish brown and brown silty clay
16 to 36 inches—brown clay
36 to 48 inches—brown clay loam
48 to 57 inches—light brown gravelly sandy loam
57 inches—soft lacustrine tuff
Depth class: Deep

Drainage class: Moderately well drained
Slowest permeability class: Slow
Available water capacity: High
Highest shrink-swell potential: High
Surface runoff: Ponded
Depth to bedrock: 40 to 60 inches
Water table: At the surface to 12 inches below the surface from January through May; at a depth of 12 to 36 inches from May through June; at a depth of 36 to 60 inches from June through October
Kind of water table: Perched
Ponding: 12 inches above the surface for long periods from January through March
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Cuppy soils, which are 20 to 40 inches deep to a hardpan over hard bedrock; on foot slopes
• Lassen soils, which are 20 to 40 inches deep to hard bedrock; on foot slopes
• Ollierivas soils, which are 20 to 40 inches deep to a hardpan; on mounds and foot slopes
• Pit soils, which are more than 60 inches deep; near stream channels

Use and Management

Land use: Irrigated crops, livestock grazing, or wetland wildlife habitat

Irrigated crops

Common crops: Grass-legume hay and wild rice
Major management factors: Ponding, high water table, slow permeability
Management considerations:
• Ponding and the high water table can damage deep-rooted crops.
• Careful management of irrigation is needed to avoid raising the water table.
• Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.

Livestock grazing

Common plants: Silver sagebrush, Nevada bluegrass
Major management factors: Ponding, high water table, shrink-swell
Management considerations:
• The high water table saturates the soil in winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
• The ponding, the high water table, and the shrink-swell potential limit the choice of plant species. Frequency, intensity, and duration of grazing can affect the composition of the plant community.
• Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Wetland wildlife habitat

Management considerations:
• This unit can provide important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
• Drainage of wetlands in areas of this unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: IVs-5, irrigated and nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland in irrigated areas that are drained
Range site: Clay Basin, MAP 14-18 (21e)

291—Revit fine sandy loam, 2 to 30 percent slopes

Setting

Landform: Mountains
Elevation: 4,500 to 5,700 feet
Slope range: 2 to 30 percent
Vegetation: Mixed conifers
Mean annual precipitation: 50 to 60 inches
Mean annual air temperature: 38 to 45 degrees F
Mean annual soil temperature: 42 to 46 degrees F
Frost-free period: 75 to 115 days

Composition

Revit and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Revit Soil

Parent material: Tephra
Typical profile:
2 inches to 0—duff
0 to 20 inches—very dark grayish brown, dark grayish brown, and dark brown fine sandy loam
20 to 30 inches—brown gravelly fine sandy loam
30 to 36 inches—brown extremely stony fine sandy loam

36 inches—fractured basalt
Depth class: Deep
Drainage class: Somewhat excessively drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Slow to rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

- Bundora soils, which are more than 60 inches deep and have an argillic horizon; on toe slopes
- Rock outcrop; on shoulders
- Soils that are more than 40 inches deep to hard bedrock; on back slopes and foot slopes
- Soils that have more than 35 percent rock fragments in the profile; on back slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, incense cedar, knobcone pine, ponderosa pine
Mean site index for stated species: White fir—84
Dunning site class: 1
CACTOS site index: 90
Common understory plants: Greenleaf manzanita, pinemat manzanita, whitethorn ceanothus, deerbrush, squawcarpet, snowbrush ceanothus, bitter cherry

Timber production

Major management factors: Water erosion, depth to rock, plant competition
Management considerations:
- Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- Roads and landings can be protected from erosion by constructing water bars.
- Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
- Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
- Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
- Trees suitable for planting include white fir and ponderosa pine.

Interpretive Groups

Land capability classification: IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 14A

292—Ricketts-Orhood complex, 2 to 15 percent slopes

Setting

Landform: Hills
Elevation: 4,200 to 5,000 feet
Slope range: 2 to 15 percent
Vegetation: Grasses, big sagebrush, and scattered juniper
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 47 to 49 degrees F
Mean annual soil temperature: 49 to 51 degrees F
Frost-free period: 80 to 100 days

Composition

Ricketts and similar soils: 45 percent
Orhood and similar soils: 35 percent
Contrasting inclusions: 20 percent

Characteristics of the Ricketts Soil

Position on the landscape: Foot slopes
Important surface feature: About 20 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Colluvium from extrusive igneous rock
Typical profile:
0 to 10 inches—brown and dark brown very cobbly loam
10 to 26 inches—dark brown and dark yellowish brown very cobbly loam
26 inches—fractured basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Orhood Soil

Position on the landscape: Side slopes
Important surface feature: About 30 to 50 percent

of the surface is covered with cobbles and stones.
Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
0 to 8 inches—brown very cobbly loam
8 to 16 inches—brown very cobbly clay loam
16 inches—hard basalt
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: 14 to 20 inches
Hazard of water erosion in bare areas: Low or moderate
Hazard of soil blowing in bare areas: None

Contrasting Inclusions

• Jellico soils, which are 20 to 40 inches deep to hard bedrock and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on side slopes
• Ollierivas soils, which are 20 to 40 inches deep to a hardpan over hard bedrock and have more than 35 percent clay in the subsoil; on foot slopes
• Splawn soils, which are 20 to 40 inches deep to hard bedrock and have more than 35 percent clay and rock fragments in the subsoil; on foot slopes

Use and Management

Land use: Livestock grazing or wood products

Livestock grazing

Common plants on the Ricketts soil: Bluebunch wheatgrass, rubber rabbitbrush, mountain big sagebrush, Lemmon needlegrass
Common plants on the Orhood soil: Idaho fescue, mountain big sagebrush, rubber rabbitbrush, Thurber needlegrass, bluebunch wheatgrass
Major management factors: Ricketts—water erosion, rock fragments, limited available water capacity; Orhood—water erosion, depth to rock, rock fragments, limited available water capacity
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Wood products

Major management factors: Water erosion, rock fragments
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The rock fragments on the surface can interfere with the harvesting of wood products.

Interpretive Groups

Land capability classification: Ricketts—IVs-7, nonirrigated; Orhood—VIIs, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Ricketts—Cobbly Loam, MAP 14-16 (21e); Orhood—Stony Loam, MAP 14-18 (21e)

293—Ricketts-Orhood complex, 15 to 30 percent slopes

Setting

Landform: Hills
Elevation: 4,200 to 5,000 feet
Slope range: 15 to 30 percent
Vegetation: Grasses and big sagebrush
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 47 to 49 degrees F
Mean annual soil temperature: 49 to 51 degrees F
Frost-free period: 80 to 100 days

Composition

Ricketts and similar soils: 45 percent
Orhood and similar soils: 35 percent
Contrasting inclusions: 20 percent

Characteristics of the Ricketts Soil

Position on the landscape: Side slopes
Important surface feature: About 20 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Colluvium from extrusive igneous rock

Typical profile:
0 to 10 inches—brown and dark brown very cobbly loam
10 to 26 inches—dark brown and dark yellowish brown very cobbly loam
26 inches—fractured basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Moderate

Characteristics of the Orhood Soil

Position on the landscape: Shoulders
Important surface feature: About 30 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
0 to 8 inches—brown very cobbly loam
8 to 16 inches—brown very cobbly clay loam
16 inches—hard basalt
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 14 to 20 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

• Jellico soils, which are 20 to 40 inches deep to hard bedrock and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on side slopes
• Longcreek soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent clay and rock fragments in the subsoil; on back slopes and escarpments
• Soils that are similar to the Ricketts soil but are 20 to 40 inches deep to a hardpan; on foot slopes
• Splawn soils, which are 20 to 40 inches deep and have more than 35 percent clay and rock fragments in the subsoil; on side slopes

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants on the Ricketts soil: Bluebunch wheatgrass, rubber rabbitbrush, mountain big sagebrush, Lemmon needlegrass
Common plants on the Orhood soil: Mountain big sagebrush, rubber rabbitbrush, Thurber needlegrass, bluebunch wheatgrass, Idaho fescue
Major management factors: Ricketts—water erosion, rock fragments, limited available water capacity; Orhood—water erosion, depth to rock, rock fragments, limited available water capacity
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: Ricketts—IVs-7, nonirrigated; Orhood—VIIs, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Ricketts—Cobbly Loam, MAP 14-16 (21e); Orhood—Stony Loam, MAP 14-18 (21e)

294—Ricketts-Orhood complex, 30 to 50 percent slopes

Setting

Landform: Hills
Elevation: 4,200 to 5,000 feet
Slope range: 30 to 50 percent
Vegetation: Grasses and big sagebrush
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 47 to 49 degrees F
Mean annual soil temperature: 49 to 51 degrees F
Frost-free period: 80 to 100 days

Composition

Ricketts and similar soils: 50 percent
Orhood and similar soils: 35 percent
Contrasting inclusions: 15 percent

Characteristics of the Ricketts Soil

Position on the landscape: Side slopes
Important surface feature: About 20 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Colluvium from extrusive igneous rock
Typical profile:
0 to 10 inches—brown and dark brown very cobbly loam
10 to 26 inches—dark brown and dark yellowish brown very cobbly loam
26 inches—fractured basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Moderate or high

Characteristics of the Orhood Soil

Position on the landscape: Escarpments
Important surface feature: About 10 to 20 percent of the surface is covered with cobbles and stones.
Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
0 to 8 inches—brown very cobbly loam
8 to 16 inches—brown very cobbly clay loam
16 inches—hard basalt
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 14 to 20 inches
Hazard of water erosion in bare areas: Moderate or high
Hazard of soil blowing in bare areas: None

Contrasting Inclusions

• Coneward soils, which are more than 60 inches deep and have sandy textures throughout; on foot slopes
• Datom soils, which are less than 20 inches deep to weathered bedrock and have more than 35 percent clay in the subsoil; on shoulders
• Jellycamp soils, which are less than 20 inches deep to a hardpan over hard bedrock and have more than 35 percent clay in the subsoil; on foot slopes
• Longcreek soils, which are less than 20 inches deep to hard bedrock and have more than 35 percent clay and rock fragments in the subsoil; on escarpments
• Rubble land; on escarpments
• Splawn soils, which are 20 to 40 inches deep to hard bedrock and have more than 35 percent clay and rock fragments in the subsoil; on foot slopes

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants: Mountain big sagebrush, rubber rabbitbrush, Thurber needlegrass, bluebunch wheatgrass, Idaho fescue
Major management factors: Ricketts—water erosion, slope, rock fragments, limited available water capacity; Orhood—water erosion, slope, depth to rock, rock fragments, limited available water capacity
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The slope and the rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Fencing, water development, and forage supplements can improve livestock distribution.
• Forage production is limited by the shallow rooting depth. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils requires special design.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: Ricketts—VIe, nonirrigated; Orhood—VIIe, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Ricketts and Orhood—Stony Loam, MAP 14-18 (21e)

295—Ricketts-Sweagert complex, 2 to 15 percent slopes

Setting

Landform: Stream terraces
Elevation: 6,000 to 6,200 feet
Slope range: 2 to 15 percent
Vegetation: Grasses and big sagebrush
Mean annual precipitation: 12 to 18 inches
Mean annual air temperature: 44 to 46 degrees F
Mean annual soil temperature: 45 to 47 degrees F
Frost-free period: 80 to 100 days

Composition

Ricketts and similar soils: 45 percent
Sweagert and similar soils: 40 percent
Contrasting inclusions: 15 percent

Characteristics of the Ricketts Soil

Position on the landscape: Foot slopes
Parent material: Colluvium from extrusive igneous rock
Typical profile:
0 to 5 inches—brown sandy loam
5 to 12 inches—brown loam
12 to 22 inches—yellowish brown very gravelly loam
22 to 33 inches—yellowish brown extremely gravelly loam
33 inches—weathered andesite
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Sweagert Soil

Position on the landscape: Back slopes and foot slopes
Parent material: Slope alluvium from extrusive igneous rock
Slope: 2 to 5 percent
Typical profile:
0 to 10 inches—brown loam
10 to 16 inches—brown clay loam
16 to 23 inches—brown extremely gravelly sandy loam
23 to 35 inches—light yellowish brown silty clay loam
35 inches—weathered tuff
Depth class: Moderately deep
Drainage class: Moderately well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Moderate
Surface runoff: Ponded
Depth to bedrock: 20 to 40 inches
Water table: 0 to 36 inches from December through April; 36 to 60 inches from May through October
Kind of water table: Perched
Ponding: 6 inches above the surface from December through April
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Esro soils, which are more than 60 inches deep; on the lower toe slopes
• Soils that are more than 40 inches deep to bedrock; on toe slopes
• Soils that are less than 20 inches deep to bedrock; on shoulders

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants: Mountain brome, little oniongrass, mountain big sagebrush, Lemmon needlegrass
Major management factors: Ricketts—water erosion; Sweagert—high water table
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 30 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The high water table saturates the soil in winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
• The high water table limits the choice of plant species that can be used for seeding.
• Frequency, intensity, and duration of grazing affect the composition of the plant community.

Interpretive Groups

Land capability classification: Ricketts—IVe-4, nonirrigated; Sweagert—IVw-8, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Range site: Ricketts and Sweagert—Loamy Upland, MAP 20+ (22e)

296—Ricketts-Searvar complex, 5 to 30 percent slopes

Setting

Landform: Hills
Elevation: 5,800 to 6,500 feet
Slope range: 5 to 30 percent
Vegetation: Grasses and big sagebrush
Mean annual precipitation: 12 to 18 inches
Mean annual air temperature: 44 to 46 degrees F
Mean annual soil temperature: 45 to 47 degrees F
Frost-free period: 80 to 100 days

Composition

Ricketts and similar soils: 50 percent
Searvar and similar soils: 35 percent
Contrasting inclusions: 15 percent

Characteristics of the Ricketts Soil

Position on the landscape: Foot slopes
Parent material: Colluvium from extrusive igneous rock
Slope: 5 to 15 percent
Typical profile:
0 to 5 inches—brown sandy loam
5 to 12 inches—brown loam
12 to 22 inches—yellowish brown very gravelly loam
22 to 33 inches—yellowish brown extremely gravelly loam
33 inches—weathered andesite
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Medium or rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Searvar Soil

Position on the landscape: Back slopes
Parent material: Colluvium from extrusive igneous rock
Typical profile:
0 to 6 inches—grayish brown gravelly loam
6 to 18 inches—brown very cobbly loam
18 to 28 inches—pale brown very cobbly loam
28 to 53 inches—very pale brown, weathered tuff
53 inches—tuff
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Medium or rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Erig soils, which are 40 to 60 inches deep to hard bedrock and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on back slopes that have north aspects
• Soils that are similar to the Ricketts soil but have less than 35 percent rock fragments in the subsoil; on toe slopes
• Trojan soils, which are 40 to 60 inches deep to hard bedrock; on foot slopes

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants: Antelope bitterbrush, mountain big sagebrush, bluebunch wheatgrass, Idaho fescue
Major management factors: Water erosion
Management considerations:
• Maintaining a cover of vegetation, such as grass and brush, on about 45 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.

Interpretive Groups

Land capability classification: Ricketts and Searvar—IVe-4, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Ricketts and Searvar—Cool Cobbly Loam, MAP 16-18 (21e)

297—Rivalier very gravelly sandy loam, 15 to 30 percent slopes

Setting

Landform: Mountains
Elevation: 4,800 to 6,300 feet
Slope range: 15 to 30 percent
Vegetation: White fir, sugar pine, and shrubs
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 39 to 45 degrees F
Mean annual soil temperature: 44 to 47 degrees F
Frost-free period: 50 to 80 days

Composition

Rivalier and similar soils: 85 percent

Contrasting inclusions: 15 percent

Characteristics of the Rivalier Soil

Parent material: Tephra
Typical profile:
3 inches to 0—duff
0 to 4 inches—brown very gravelly sandy loam
4 to 27 inches—light yellowish brown and very pale brown very gravelly sandy loam
27 inches—tuff
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Roundbarn soils, which are 40 to 60 inches deep to weathered bedrock and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on back slopes
• Said soils, which are 40 to 60 inches deep to weathered bedrock and have less than 35 percent clay in the subsoil; on toe slopes
• Soils that are less than 20 inches deep to hard bedrock; on shoulders

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: Ponderosa pine, incense cedar, white fir, California black oak, sugar pine
Mean site index for stated species: Ponderosa pine—80; white fir—54
Dunning site class: 3
CACTOS site index: 58
Common understory plants: Serviceberry, snowbrush ceanothus, rubber rabbitbrush, rose

Timber production

Major management factors: Water erosion, depth to rock, compaction hazard, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
• The depth to rock hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir, sugar pine, and ponderosa pine.

Interpretive Groups

Land capability classification: VIs, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 5F

298—Rivalier very gravelly sandy loam, 30 to 50 percent slopes

Setting

Landform: Mountains
Elevation: 4,800 to 6,300 feet
Slope range: 30 to 50 percent
Vegetation: White fir, sugar pine, and shrubs
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 39 to 45 degrees F
Mean annual soil temperature: 44 to 47 degrees F

Frost-free period: 50 to 80 days

Composition

Rivalier and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Rivalier Soil

Parent material: Tephra
Typical profile:
0 to 11 inches—brown and light yellowish brown very gravelly sandy loam
11 to 24 inches—reddish yellow very gravelly sandy loam
24 inches—tuff
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Moderate or high

Contrasting Inclusions

• Rock outcrop; on escarpments
• Roundbarn soils, which are 40 to 60 inches deep to weathered bedrock; on foot slopes
• Soils that are less than 20 inches deep to hard bedrock; on escarpments and shoulders

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, California black oak, sugar pine, ponderosa pine, incense cedar
Mean site index for stated species: White fir—54; ponderosa pine—80
Dunning site class: 3
CACTOS site index: 58
Common understory plants: Serviceberry, snowbrush ceanothus, rubber rabbitbrush, rose

Timber production

Major management factors: Water erosion, slope, depth to rock, compaction hazard, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• The slope limits the kinds of equipment that can be used in forest management.
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
• The depth to rock hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir, sugar pine, and ponderosa pine.

Interpretive Groups

Land capability classification: VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 5R

299—Rivalier very gravelly sandy loam, 50 to 75 percent slopes

Setting

Landform: Mountains
Elevation: 4,800 to 6,300 feet

Slope range: 50 to 75 percent
Vegetation: White fir, sugar pine, and shrubs
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 30 to 45 degrees F
Mean annual soil temperature: 44 to 47 degrees F
Frost-free period: 50 to 80 days

Composition

Rivalier and similar soils: 90 percent
Contrasting inclusions: 10 percent

Characteristics of the Rivalier Soil

Parent material: Tephra
Typical profile:
1 inch to 0—duff
0 to 2 inches—yellowish brown very gravelly sandy loam
2 to 20 inches—yellowish brown and light yellowish brown very gravelly sandy loam
20 inches—tuff
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Very rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: High

Contrasting Inclusions

• Rock outcrop; on escarpments
• Soils that are less than 20 inches deep to hard bedrock; on escarpments and shoulders

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, ponderosa pine, incense cedar, sugar pine, California black oak
Mean site index for stated species: White fir—54; ponderosa pine—80
Dunning site class: 3
CACTOS site index: 58
Common understory plants: Serviceberry, snowbrush ceanothus, rubber rabbitbrush, rose

Timber production

Major management factors: Water erosion, slope, very rapid runoff, depth to rock, compaction hazard, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Maintaining the understory vegetation is essential in controlling erosion.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• The very rapid runoff rate can result in severe erosion if water is allowed to concentrate in bare areas, such as skid trails or roads.
• Using conventional harvesting methods is difficult because of the slope.
• The slope limits the use of wheeled and tracked equipment in skidding operations. End lining generally causes less disturbance of the soil.
• Because of the limited soil depth, keeping soil displacement and disturbances to a minimum helps to maintain long-term productivity.
• The depth to rock hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir and sugar pine.

Interpretive Groups

Land capability classification: VIIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 5R

300—Riverwash

Setting

Landform: Flood plains
Elevation: 2,500 to 5,000 feet
Slope range: 0 to 2 percent
Vegetation: Shrubs and grasses
Mean annual precipitation: 14 to 60 inches
Mean annual air temperature: 47 to 50 degrees F
Mean annual soil temperature: 48 to 52 degrees F
Frost-free period: 80 to 120 days

Composition

Riverwash: 85 percent
Contrasting inclusions: 15 percent

Characteristics of Riverwash

• Riverwash consists of areas of highly variable accumulations of sand, gravel, cobbles, and stones. These areas are subject to frequent flooding.

Contrasting Inclusions

• Jadpor soils, which are more than 60 inches deep and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on foot slopes
• Keddie soils, which are more than 60 inches deep and have less than 35 percent clay in the subsoil; on the lower toe slopes
• Matquaw soils, which are more than 60 inches deep and have less than 18 percent clay; on toe slopes

Use and Management

Land use: Wetland wildlife habitat

Wetland wildlife habitat

Management considerations:
• Areas of Riverwash that are frequently flooded for long periods are hydric soils. Riverwash may provide important wetland habitat for waterfowl during spring and fall migrations, during the formation of breeding pairs, and for nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created on this map unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
• Drainage of wetlands in areas of this map unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: VIII, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland

301—Roundbarn-Said complex, 15 to 30 percent slopes

Setting

Landform: Mountains
Elevation: 5,000 to 6,300 feet
Slope range: 15 to 30 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 20 to 30 inches
Mean annual air temperature: 39 to 45 degrees F
Mean annual soil temperature: 41 to 47 degrees F
Frost-free period: 50 to 80 days

Composition

Roundbarn and similar soils: 45 percent
Said and similar soils: 35 percent
Contrasting inclusions: 20 percent

Characteristics of the Roundbarn Soil

Position on the landscape: Back slopes
Parent material: Slope alluvium from tephra
Typical profile:
0 to 10 inches—dark grayish brown gravelly sandy loam
10 to 24 inches—brown very cobbly sandy loam
24 to 41 inches—brown very cobbly sandy clay loam
41 to 50 inches—brown very cobbly sandy loam
50 inches—weathered basalt
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Moderate

Characteristics of the Said Soil

Position on the landscape: Back slopes and foot slopes
Parent material: Slope alluvium from basalt
Typical profile:
0 to 8 inches—grayish brown and brown gravelly loam
8 to 41 inches—yellowish brown and brown gravelly loam
41 to 50 inches—brown very cobbly clay loam
50 inches—weathered basalt
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately slow

Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Moderate or high

Contrasting Inclusions

- Rivalier soils, which are 20 to 40 inches deep to hard bedrock; on shoulders
- Soils that are similar to the Roundbarn soil but are more than 60 inches deep to bedrock; on toe slopes
- Soils that are similar to the Said soil but are more than 60 inches deep; on toe slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Roundbarn soil

Main tree species: White fir, ponderosa pine, incense cedar, California black oak, sugar pine
Mean site index for stated species: White fir—49
Dunning site class: 3
CACTOS site index: 56
Common understory plants: Greenleaf manzanita, western chokecherry

Woodland vegetation on the Said soil

Main tree species: Ponderosa pine, white fir
Mean site index for stated species: Ponderosa pine—83; white fir—53
Dunning site class: 3
CACTOS site index: 51
Common understory plants: Mountain big sagebrush, Idaho fescue, whitethorn ceanothus, squawcarpet, greenleaf manzanita

Timber production

Major management factors: Roundbarn—water erosion, compaction hazard, plant competition, hazard of fire damage; Said—water erosion, compaction hazard, plant competition
Management considerations:
- Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
- Roads and landings can be protected from erosion by constructing water bars.
- Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
- Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
- The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
- Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
- Maintenance of evenly distributed organic material, such as limbs and needles, improves productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
- Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
- Trees suitable for planting include white fir, ponderosa pine, and sugar pine.

Interpretive Groups

Land capability classification: Roundbarn—IVe-4, nonirrigated; Said—VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Roundbarn—6F; Said—5A

302—Rubble land-Argixerolls-Rock outcrop complex, 30 to 75 percent slopes

Setting

Landform: Lava plateau escarpments
Elevation: 2,700 to 5,400 feet
Slope range: 30 to 75 percent
Vegetation: Ponderosa pine, oak, shrubs, and grasses
Mean annual precipitation: 12 to 20 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 50 to 52 degrees F
Frost-free period: 80 to 120 days

Composition

Rubble land: 40 percent
Argixerolls and similar soils: 30 percent
Rock outcrop: 20 percent
Contrasting inclusions: 10 percent

Characteristics of the Rubble Land

• Rubble land consists of areas of steep slopes covered with loose colluvium of stones, cobbles, and boulders that have accumulated near the base of the slope. Most areas are virtually devoid of vegetation, but in some areas a few trees, shrubs, or grasses grow between the rocks.

Characteristics of the Argixerolls

Position on the landscape: Foot slopes
Parent material: Colluvium from extrusive igneous rock
Representative profile:
0 to 7 inches—dark grayish brown stony sandy loam
7 to 15 inches—dark grayish brown very stony sandy clay loam
15 to 25 inches—dark grayish brown extremely stony sandy clay loam
25 inches—fractured basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Very low
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: 10 to more than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Rock Outcrop

• Rock outcrop consists of exposures of hard fractured bedrock. The exposures have nearly vertical sides that abruptly terminate at the adjacent landscape. The vertical sides may drop by as much as 1,000 feet. Most areas of Rock outcrop are virtually devoid of vegetation, but in some areas trees, shrubs, or grasses grow between the rocks.

Contrasting Inclusions

• Jellico soils, which are 20 to 40 inches deep to hard bedrock and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on the north and west back slopes
• Searvar soils, which are 20 to 40 inches deep to weathered bedrock and have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on the south and east back slopes
• Shallow soils that have various textures
• Splawn soils, which are 20 to 40 inches deep to hard bedrock and have more than 35 percent clay and rock fragments in the subsoil; on the north and west back slopes

Use and Management

Land use: Livestock grazing or homesite development

Livestock grazing

Major management factors: Rubble land—slope, large stones; Argixerolls—slope, water erosion; Rock outcrop—slope, large stones
Management considerations:
• The slope limits access by most types of equipment and by livestock. Fencing, water development, and forage supplements can improve livestock distribution.
• If seeding is desired, broadcast methods should be considered.
• Forage production is limited by the shallow rooting depth and large stones. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils may require special design.
• Maintaining a cover of vegetation, such as grass and brush, on about 16 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.

Interpretive Groups

Land capability classification: VIII, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland

303—Rubble land-Rock outcrop complex, 30 to 75 percent slopes

Setting

Landform: Mountains
Elevation: 2,700 to 5,400 feet
Slope range: 30 to 75 percent
Vegetation: Grasses and forbs
Mean annual precipitation: 12 to 20 inches
Mean annual air temperature: 48 to 52 degrees F

Composition

Rubble land: 50 percent
Rock outcrop: 40 percent
Contrasting inclusions: 10 percent

Characteristics of the Rubble Land

• Rubble land consists of areas of steep slopes covered with loose colluvium of stones, cobbles, and boulders that have accumulated near the base of the

slope. Most areas are virtually devoid of vegetation, but in some areas trees, shrubs, or grasses grow between the rocks.

Characteristics of the Rock Outcrop

• Rock outcrop consists of exposures of hard fractured bedrock. The exposures have nearly vertical sides that abruptly terminate at the adjacent landscape. The vertical sides may drop by as much as 1,000 feet. Most areas of Rock outcrop are virtually devoid of vegetation, but in some areas trees, shrubs, or grasses grow between the rocks.

Contrasting Inclusions

• Shallow or very shallow soils that have various textures

Use and Management

Land use: Wildlife habitat

Interpretive Groups

Land capability classification: VIII, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland

304—Rubble land-Typic Vitrixerands complex, 30 to 50 percent slopes

Setting

Landform: Mountains
Elevation: 5,400 to 7,863 feet
Slope range: 30 to 50 percent
Vegetation: Shrubs and scattered conifers
Mean annual precipitation: 35 to 60 inches
Mean annual air temperature: 39 to 41 degrees F
Mean annual soil temperature: 41 to 45 degrees F
Frost-free period: 50 to 80 days

Composition

Rubble land: 45 percent
Typic Vitrixerands and similar soils: 40 percent
Contrasting inclusions: 15 percent

Characteristics of the Rubble Land

• Rubble land consists of areas of steep slopes covered with loose colluvium of stones, cobbles, and boulders that have accumulated near the base of the slope. Most areas generally are barren, but in some areas a few trees, shrubs, or grasses grow between the rocks.

Characteristics of the Typic Vitrixerands

Position on the landscape: Side slopes
Parent material: Tephra
Representative profile:
0 to 3 inches—very dark gray very gravelly sandy loam
3 to 6 inches—very pale brown very gravelly sandy loam
6 to 13 inches—pale brown extremely gravelly loamy sand
13 to 25 inches—yellowish brown very gravelly sandy loam
25 to 33 inches—yellowish brown extremely gravelly loamy sand
33 to 67 inches—brown extremely gravelly loamy sand and yellowish brown extremely gravelly sandy loam
Depth class: Moderately deep to very deep
Drainage class: Somewhat excessively drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 90 inches
Hazard of water erosion in bare areas: Moderate or high

Contrasting Inclusions

• Areas that have slopes of more than 50 percent
• Soils that have a cemented substratum; on foot slopes
• Zeugirdor soils, which have fragmental over medial-skeletal material; on foot slopes

Use and Management

Land use: Wildlife habitat

Interpretive Groups

Land capability classification: Rubble land—VIII, nonirrigated; Typic Vitrixerands—VIs, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland

305—Rubble land-Xerorthents complex, 50 to 70 percent slopes

Setting

Landform: Mountains
Elevation: 3,500 to 5,000 feet
Slope range: 50 to 70 percent
Vegetation: Shrubs, grasses, and scattered conifers
Mean annual precipitation: 35 to 60 inches
Mean annual air temperature: 39 to 51 degrees F
Mean annual soil temperature: 41 to 49 degrees F
Frost-free period: 50 to 100 days

Composition

Rubble land: 45 percent
Xerorthents and similar soils: 40 percent
Contrasting inclusions: 15 percent

Characteristics of the Rubble Land

• Rubble land consists of areas of steep slopes covered with loose colluvium of stones, cobbles, and boulders that have accumulated near the base of the slope. Most areas are virtually devoid of vegetation, but in some areas a few trees, shrubs, or grasses grow between the rocks.

Characteristics of the Xerorthents

Position on the landscape: Back slopes and escarpments
Parent material: Colluvium from extrusive igneous rock
Representative profile:
0 to 3 inches—very dark grayish brown loam
3 to 22 inches—dark grayish brown cobbly sandy loam
22 to 34 inches—brown very cobbly sandy loam
34 inches—soft tuff
Depth class: Moderately deep to very deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Very rapid
Depth to bedrock: 20 to 90 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Nanny soils, which are more than 60 inches deep and have more than 35 percent rock fragments in the profile; next to stream channels
• Neer soils, which are 20 to 40 inches deep to weathered bedrock; on back slopes
• Nikal soils, which are 20 to 40 inches deep to hard bedrock; on back slopes
• Soils that are less than 20 inches deep to bedrock; on shoulders

Use and Management

Land use: Wildlife habitat

Interpretive Groups

Land capability classification: Rubble land—VIII, nonirrigated; Xerorthents—VIIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland

306—Scarface sandy loam, 2 to 15 percent slopes

Setting

Landform: Lava plateaus and hills
Elevation: 3,400 to 4,400 feet
Slope range: 2 to 15 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Scarface and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Scarface Soil

Parent material: Tephra
Typical profile:
2 inches to 0—duff
0 to 16 inches—dark yellowish brown and strong brown sandy loam
16 to 24 inches—strong brown sandy loam
24 to 37 inches—strong brown gravelly sandy clay loam
37 to 84 inches—yellowish brown gravelly sandy clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very high
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Gasper soils, which have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on foot slopes
• Jimmerson soils, which have less volcanic glass than the Scarface soil; on toe slopes
• Soils that are less than 40 inches deep; on the steeper side slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, California black oak, incense cedar, ponderosa pine, sugar pine

Mean site index for stated species: Ponderosa pine—97
Dunning site class: 2
CACTOS site index: 65
Common understory plants: Greenleaf manzanita, antelope bitterbrush, serviceberry, squawcarpet

Timber production

Major management factors: Water erosion, compaction hazard, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir and sugar pine.

Interpretive Groups

Land capability classification: IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 7A

307—Scarface sandy loam, 15 to 30 percent slopes

Setting

Landform: Lava plateaus and hills
Elevation: 3,400 to 4,400 feet
Slope range: 15 to 30 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Scarface and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Scarface Soil

Parent material: Tephra
Typical profile:
2 inches to 0—duff
0 to 16 inches—dark yellowish brown sandy loam
16 to 24 inches—strong brown sandy loam
24 to 37 inches—strong brown gravelly sandy clay loam
37 to 84 inches—yellowish brown gravelly sandy clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very high
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

• Gasper soils, which have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on foot slopes
• Jimmerson soils, which have less volcanic glass than the Scarface soil; on toe slopes
• Soils that are less than 40 inches deep; on the steeper side slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: California black oak, incense cedar, sugar pine, white fir
Mean site index for stated species: Ponderosa pine—71
Dunning site class: 2
CACTOS site index: 65
Common understory plants: Greenleaf manzanita, antelope bitterbrush, serviceberry, squawcarpet

Timber production

Major management factors: Water erosion, compaction hazard, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.

• Roads and landings can be protected from erosion by constructing water bars.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir and sugar pine.

Interpretive Groups

Land capability classification: IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 7A

308—Scarface-Gasper complex, 2 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 3,200 to 5,100 feet
Slope range: 2 to 15 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 49 degrees F
Frost-free period: 80 to 100 days

Composition

Scarface and similar soils: 50 percent
Gasper and similar soils: 35 percent
Contrasting inclusions: 15 percent

Characteristics of the Scarface Soil

Position on the landscape: Foot slopes
Parent material: Tephra
Typical profile:
1 inch to 0—duff
0 to 16 inches—dark yellowish brown and strong brown sandy loam
16 to 24 inches—strong brown sandy loam
24 to 37 inches—strong brown gravelly sandy clay loam
37 to 52 inches—yellowish brown gravelly sandy clay loam
52 to 84 inches—yellowish brown gravelly sandy clay loam and brownish yellow gravelly clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Very high
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Gasper Soil

Position on the landscape: Foot slopes
Parent material: Tephra
Typical profile:
0 to 4 inches—brown gravelly sandy loam
4 to 16 inches—reddish brown gravelly sandy loam
16 to 38 inches—light reddish brown very cobbly sandy loam and extremely stony sandy loam
38 to 60 inches—light reddish brown and light brown very cobbly sandy clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Boardburn soils, which are 40 to 60 inches deep to weathered bedrock and have less than 35 percent clay in the subsoil; on toe slopes
• Fleener soils, which are more than 60 inches deep, have more than 35 percent rock fragments and less than 35 percent clay in the subsoil, and have a dark surface layer; on foot slopes
• Hambone soils, which are 40 to 60 inches deep to weathered bedrock; on shoulders
• Loveness soils, which are more than 60 inches deep, have less than 35 percent clay in the subsoil, and have a dark surface layer; on toe slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Scarface soil

Main tree species: Ponderosa pine, incense cedar, sugar pine, white fir

Mean site index for stated species: Jeffrey pine and ponderosa pine—97
Dunning site class: 2
CACTOS site index: 65
Common understory plants: Snowbrush ceanothus, squawcarpet, gooseberry, greenleaf manzanita, bottlebrush squirreltail, serviceberry

Woodland vegetation on the Gasper soil

Main tree species: Ponderosa pine, sugar pine, incense cedar, white fir
Mean site index for stated species: Jeffrey pine and ponderosa pine—108
Dunning site class: 2
CACTOS site index: 79
Common understory plants: Greenleaf manzanita, snowbrush ceanothus, needlegrass, squawcarpet, bottlebrush squirreltail

Timber production

Major management factors: Scarface—water erosion, compaction hazard, plant competition; Gasper—compaction hazard, plant competition, hazard of fire damage
Management considerations:
• Roads and landings can be protected from erosion by constructing water bars.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Fire can damage the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 30 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Trees suitable for planting include white fir, ponderosa pine, and sugar pine.

Interpretive Groups

Land capability classification: Scarface and Gasper—IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Scarface—7A; Gasper—8F

309—Shasta loamy sand, 0 to 5 percent slopes

Setting

Landform: Outwash plains
Elevation: 3,400 to 3,600 feet
Slope range: 0 to 5 percent
Vegetation: Mixed conifers
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 47 to 50 degrees F
Mean annual soil temperature: 47 to 51 degrees F
Frost-free period: 80 to 100 days

Composition

Shasta and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Shasta Soil

Parent material: Glacial outwash from extrusive igneous rock
Typical profile:
4 inches to 0—duff
0 to 13 inches—very dark grayish brown loamy sand
13 to 30 inches—dark grayish brown and grayish brown loamy sand
30 to 70 inches—stratified, pale brown sand to gray extremely gravelly loamy sand
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability class: Very rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Very slow or slow
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Chatterdown and Ponto soils, which are more than 60 inches deep and have dominantly medial material in the profile; on toe slopes
• Nikal soils, which are 20 to 40 inches deep to hard bedrock; near lava flow outcrops
• Riverwash; next to stream channels

• Shastina soils, which are more than 60 inches deep and have more than 35 percent rock fragments in the profile; on foot slopes

Use and Management

Land use: Timber production or homesite development

Woodland vegetation

Main tree species: Ponderosa pine, white fir, sugar pine, Douglas-fir, incense cedar
Mean site index for stated species: Ponderosa pine—141
Dunning site class: 1A
CACTOS site index: 93
Common understory plants: Greenleaf manzanita, whitethorn ceanothus, bitter cherry, western chokecherry, antelope bitterbrush, squirreltail, needlegrass, western serviceberry

Timber production

Major management factors: Compaction hazard, plant competition
Management considerations:
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir and ponderosa pine.

Homesite development

Major management factors: Coarse texture
Management considerations:
• The coarse texture limits the filtering capacity. Inadequately filtered effluent can contaminate surface water or ground water. Special designs can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: IIIs-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 13S

310—Shastina loam, 0 to 5 percent slopes

Setting

Landform: Outwash plains
Elevation: 3,300 to 4,200 feet
Slope range: 0 to 5 percent
Vegetation: Mixed conifers, oaks, and shrubs
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 47 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Shastina and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Shastina Soil

Parent material: Glacial outwash from extrusive igneous rock
Typical profile:
4 inches to 0—duff
0 to 6 inches—dark brown loam
6 to 15 inches—brown gravelly sandy loam
15 to 36 inches—brown very cobbly sandy loam and yellowish brown extremely cobbly sandy loam
36 to 60 inches—brown and light gray extremely cobbly loamy coarse sand
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid in the upper part and very rapid in the lower part
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Ponto and Shasta soils, which are more than 60 inches deep and have less than 35 percent rock fragments in the profile; on toe slopes
• Riverwash; next to stream channels

Use and Management

Land use: Timber production or homesite development

Woodland vegetation

Main tree species: Ponderosa pine, Jeffrey pine, Douglas-fir, California black oak, incense cedar

Mean site index for stated species: Jeffrey pine and ponderosa pine—77
Dunning site class: 3
CACTOS site index: 54
Common understory plants: Greenleaf manzanita, pine manzanita, whitethorn ceanothus, buckbrush, bitter cherry, antelope bitterbrush, creeping sage, western chokecherry

Timber production

Major management factors: Compaction hazard, plant competition
Management considerations:
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include ponderosa pine and Douglas-fir.

Homesite development

Major management factors: Large stones
Management considerations:
• Large stones may hinder the excavation of trenches for the foundation.
• Large stones can hinder the installation of the leach field and reduce the filtering capacity. Increasing the size of the leach field can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: IIIe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 4F

311—Splawn-Jellico complex, 5 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 3,200 to 4,500 feet
Slope range: 5 to 15 percent
Vegetation: Juniper, conifers, oak, and shrubs
Mean annual precipitation: 16 to 20 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Splawn and similar soils: 45 percent
Jellico and similar soils: 40 percent
Contrasting inclusions: 15 percent

Characteristics of the Splawn Soil

Position on the landscape: Toe slopes
Important surface feature: About 20 to 40 percent of the surface is covered with cobbles and stones.
Parent material: Slope alluvium from basalt
Typical profile:
0 to 3 inches—yellowish brown very cobbly loam
3 to 10 inches—dark yellowish brown very gravelly loam
10 to 17 inches—brown very gravelly clay loam
17 to 24 inches—strong brown extremely gravelly clay loam
24 inches—hard basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Very low
Highest shrink-swell potential: High
Surface runoff: Medium
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Jellico Soil

Position on the landscape: Foot slopes
Important surface feature: About 20 to 40 percent of the surface is covered with cobbles and stones.
Parent material: Tephra
Typical profile:
0 to 5 inches—yellowish brown very stony silt loam
5 to 27 inches—yellowish brown very stony silt loam and very cobbly silt loam
27 to 33 inches—yellowish brown extremely stony silt loam
33 inches—hard basalt
Depth class: Moderately deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Low
Highest shrink-swell potential: Low
Surface runoff: Medium

Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Hunsinger soils, which are 40 to 60 inches deep to weathered bedrock; on foot slopes
• Jellycamp soils, which are less than 20 inches deep to a hardpan; on toe slopes
• Longcreek soils, which are less than 20 inches deep to hard bedrock; near escarpments

Use and Management

Land use: Wood products or grazing

Vegetation on the Splawn soil

Common plants: Bluebunch wheatgrass, Thurber needlegrass, Idaho fescue, junegrass, other perennial forbs, bottlebrush squirreltail

Woodland vegetation on the Jellico soil

Main woodland species: Ponderosa pine, Oregon white oak, California black oak, Digger pine, western juniper
Mean site index for stated species: Ponderosa pine—62; western juniper—28
Dunning site class: 4
CACTOS site index: 43
Common understory plants: Bluebunch wheatgrass, mountainmahogany, Columbia needlegrass, antelope bitterbrush, bottlebrush squirreltail

Wood products

Management considerations:
• The rock fragments in the profile hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The rock fragments on the surface can interfere with the harvesting of wood products.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.

Woodland grazing

Major management factors: Splawn—water erosion, rock fragments, limited available water capacity; Jellico—rock fragments
Management considerations:
• The rock fragments on the surface can limit access by equipment and some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Because of the limited available water capacity, intensive grazing management is needed. Frequency, intensity, and duration of grazing can affect the composition of the plant community.

Interpretive Groups

Land capability classification: Splawn—IVs-7, nonirrigated; Jellico—VIs, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Jellico—3F

312—Stacher gravelly coarse sandy loam, 15 to 30 percent slopes

Setting

Landform: Mountains
Elevation: 4,500 to 6,200 feet
Slope range: 15 to 30 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 39 to 41 degrees F
Mean annual soil temperature: 41 to 45 degrees F
Frost-free period: 50 to 80 days

Composition

Stacher and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Stacher Soil

Parent material: Tephra
Typical profile:
2 inches to 0—duff
0 to 2 inches—brown gravelly coarse sandy loam
2 to 12 inches—pale brown gravelly coarse sandy loam
12 to 23 inches—light yellowish brown very gravelly sandy clay loam
23 to 65 inches—very pale brown extremely gravelly sandy clay loam
65 inches—weathered andesitic porphyry
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

• Goulder soils, which have lower base saturation than the Stacher soil or have less than 35 percent rock fragments; on toe slopes
• Soils that are 20 to 40 inches deep to tuff; on the steeper side slopes that have southeast aspects
• Soils that have less than 35 percent rock fragments; on foot slopes
• Soil that are similar to Wyntoon soils but are frigid; on foot slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, California red fir, incense cedar, sugar pine, Douglas-fir, ponderosa pine
Mean site index for stated species: White fir—61
Dunning site class: 2
CACTOS site index: 72
Common understory plants: Greenleaf manzanita, Sierra chinkapin, princes pine, snowbrush ceanothus, serviceberry, Pacific dogwood

Timber production

Major management factors: Water erosion, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir, sugar pine, and ponderosa pine.

Interpretive Groups

Land capability classification: IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 9F

313—Stacher gravelly coarse sandy loam, 2 to 15 percent slopes

Setting

Landform: Mountains
Elevation: 4,500 to 6,200 feet
Slope range: 2 to 15 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 39 to 41 degrees F
Mean annual soil temperature: 41 to 45 degrees F
Frost-free period: 50 to 80 days

Composition

Stacher and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Stacher Soil

Parent material: Tephra
Typical profile:
2 inches to 0—duff
0 to 2 inches—brown gravelly coarse sandy loam
2 to 12 inches—pale brown gravelly coarse sandy loam
12 to 23 inches—light yellowish brown very gravelly sandy clay loam
23 to 65 inches—very pale brown extremely gravelly sandy clay loam
65 inches—weathered andesitic porphyry
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Goulder soils, which have a lower base saturation than the Stacher soil and have an argillic horizon; on toe slopes
• Soils that are similar to Goulder soils but have less than 35 percent rock fragments; on toe slopes
• Soils that are 20 to 40 inches deep to tuff; on the steeper side slopes that have southeast aspects
• Soils that have less than 35 percent rock fragments; on toe slopes
• Soils that are similar to Wyntoon soils but are frigid; on toe slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, Douglas-fir, ponderosa pine, sugar pine, California red fir, incense cedar
Mean site index for stated species: White fir—61
Dunning site class: 2
CACTOS site index: 72
Common understory plants: Greenleaf manzanita, princes pine, snowbrush ceanothus, serviceberry, Sierra chinkapin, Pacific dogwood

Timber production

Major management factors: Water erosion, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir, sugar pine, and ponderosa pine.

Interpretive Groups

Land capability classification: IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 9F

314—Stacher very gravelly coarse sandy loam, 30 to 50 percent slopes

Setting

Landform: Mountains
Elevation: 4,500 to 6,200 feet
Slope range: 30 to 50 percent
Vegetation: Mixed conifers and shrubs (fig. 11)
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 39 to 41 degrees F
Mean annual soil temperature: 41 to 45 degrees F
Frost-free period: 50 to 80 days

Composition

Stacher and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Stacher Soil

Parent material: Tephra
Typical profile:
3 inches to 0—duff
0 to 4 inches—brown very gravelly coarse sandy loam
4 to 14 inches—light brown gravelly coarse sandy loam
14 to 25 inches—light brown very gravelly sandy clay loam
25 to 65 inches—very pale brown extremely gravelly sandy clay loam
65 inches—weathered andesitic porphyry
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

• Danhunt soils, which have more than 35 percent rock fragments throughout; on back slopes
• Goulder soils, which have medial over loamy-skeletal material; on toe slopes
• Soils that have slopes of less than 30 percent
• Soils that are similar to Goulder soils but have less than 35 percent rock fragments in the profile; on toe slopes
• Soils that are 20 to 40 inches deep to tuff; on the steeper side slopes that have southeast aspects
• Soils that have less than 35 percent rock fragments; on foot slopes
• Soils that have a lithic contact; on side slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, California red fir, sugar fir, ponderosa pine, Douglas-fir, incense cedar
Mean site index for stated species: White fir—61
Dunning site class: 2
CACTOS site index: 72
Common understory plants: Greenleaf manzanita,

princes pine, snowbrush ceanothus, serviceberry, Sierra chinkapin, Pacific dogwood

Timber production

Major management factors: Water erosion, slope, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• The slope limits the kinds of equipment that can be used in forest management.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir, sugar pine, and ponderosa pine.

Interpretive Groups

Land capability classification: VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 9R

315—Stoner gravelly sandy loam, 2 to 15 percent slopes

Setting

Landform: Alluvial fans
Elevation: 2,500 to 4,000 feet
Slope range: 2 to 15 percent
Vegetation: Grasses and forbs
Mean annual precipitation: 20 to 30 inches
Mean annual air temperature: 47 to 50 degrees F
Mean annual soil temperature: 51 to 57 degrees F
Frost-free period: 80 to 100 days

Composition

Stoner and similar soils: 90 percent
Contrasting inclusions: 10 percent

Characteristics of the Stoner Soil

Parent material: Alluvium from metasedimentary and extrusive igneous rock
Typical profile:
0 to 6 inches—dark grayish brown and yellowish brown gravelly sandy loam
6 to 42 inches—brown gravelly sandy loam and brownish yellow and reddish yellow gravelly loam
42 to 74 inches—light yellowish brown very gravelly sandy loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderate
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Jadpor soils, which have an argillic horizon; on foot slopes
• Odas soils, which have less than 35 percent rock fragments in the profile; next to stream channels
• Riverwash; in stream channels
• Soils that have more than 18 percent clay; on toe slopes

Use and Management

Land use: Irrigated crops, pasture, or homesite development

Irrigated crops

Common crops: Grass-legume hay
Major management factors: Water erosion, slope
Management considerations:
• Maintaining a cover of vegetation, such as crop residue and grass, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• During periods when the soil is bare, erosion can be controlled by properly managing crop residue or planting a cover crop.
• Limiting tillage for seedbed preparation and weed control helps to control runoff and erosion.
• Sprinkler irrigation is the most suitable method of applying water.

Pasture

Major management factors: Water erosion
Management considerations:
• Maintaining a cover of vegetation, such as mulch and grass, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.

Homesite development

Major management factors: Water erosion, slope, moderate permeability
Management considerations:
• Maintaining a permanent ground cover on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• During construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.
• If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.
• The moderate permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: IIe-4, irrigated, and IIIe-4, nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland only in irrigated areas

316—Stukel complex, 15 to 30 percent slopes

Setting

Landform: Hills
Elevation: 4,000 to 4,800 feet
Slope range: 15 to 30 percent
Vegetation: Grasses and big sagebrush
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 48 degrees F
Mean annual soil temperature: 48 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Stukel gravelly sandy loam and similar soils: 45 percent
Stukel very cobbly sandy loam and similar soils: 30 percent
Contrasting inclusions: 25 percent

Characteristics of Stukel Gravelly Sandy Loam

Position on the landscape: Shoulders
Parent material: Slope alluvium from pumiceous tuff
Typical profile:
0 to 4 inches—grayish brown gravelly sandy loam
4 to 16 inches—grayish brown sandy loam
16 inches—pumiceous tuff
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 10 to 20 inches
Hazard of water erosion in bare areas: Moderate

Characteristics of Stukel Very Cobbly Sandy Loam

Position on the landscape: Side slopes
Important surface feature: About 30 to 50 percent of the surface is covered with cobbles and stones.
Parent material: Slope alluvium from pumiceous tuff
Typical profile:
0 to 4 inches—brown very cobbly sandy loam
4 to 11 inches—brown sandy loam
11 to 20 inches—brown cobbly sandy loam
20 inches—pumiceous tuff
Depth class: Shallow
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very low
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Bieber soils, which are less than 20 inches deep to a hardpan; on toe slopes
• Dotta soils, which are more than 60 inches deep; on toe slopes
• Jellycamp soils, which are less than 20 inches deep to a hardpan over hard bedrock; on foot slopes
• Modoc soils, which are 20 to 40 inches deep to a hardpan; on mounds
• Ollierivas soils, which are 20 to 40 inches deep to a hardpan; on foot slopes
• Rock outcrop; on escarpments

Use and Management

Land use: Livestock grazing

Livestock grazing

Common plants on the gravelly Stukel soil: Mountain big sagebrush, Indian ricegrass, rubber rabbitbrush, Thurber needlegrass
Common plants on the very cobbly Stukel soil: Indian ricegrass, antelope bitterbrush, mountain big sagebrush, needleandthread, Thurber needlegrass
Major management factors: Stukel, gravelly—water erosion, soil blowing, rock fragments on the surface; Stukel, very cobbly—water erosion, soil blowing, depth to rock
Management considerations:
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.
• Forage production is limited by the shallow rooting depth and the rock fragments on the surface. If seeding is desired, species that are adapted to droughty conditions should be considered.
• Fence construction on shallow soils may require special design.
• The rock fragments on the surface limit access by equipment and by some kinds of livestock. If seeding is desired, broadcast methods should be considered.
• Maintaining a cover of vegetation, such as grass and brush, on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.

Interpretive Groups

Land capability classification: Stukel, gravelly—VIIs, nonirrigated; Stukel, very cobbly—VIIe, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Stukel, gravelly—Shallow Sandy Loam, MAP 14-16 (21e); Stukel, very cobbly—Shallow Cobbly Sandy Loam, MAP 14-16 (21e)

317—Swanberger clay, 0 to 1 percent slopes

Setting

Landform: Basins
Elevation: 4,200 to 4,800 feet
Slope range: 0 to 1 percent
Vegetation: Rushes, sedges, and grasses
Mean annual precipitation: 16 to 25 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Swanberger and similar soils: 90 percent
Contrasting inclusions: 10 percent

Characteristics of the Swanberger Soil

Parent material: Alluvium from mixed volcanic rock
Typical profile:
0 to 17 inches—gray clay
17 to 52 inches—gray and dark gray clay
52 to 62 inches—light gray clay
Depth class: Very deep
Drainage class: Very poorly drained
Slowest permeability class: Slow
Available water capacity: High
Highest shrink-swell potential: High
Surface runoff: Ponded
Depth to bedrock: More than 60 inches
Water table: At the surface to 18 inches below the surface from February through April; at a depth of 18 to 48 inches from May through June; at a depth of 48 to 60 inches from July through October
Kind of water table: Perched
Ponding: 6 inches above the surface for very long periods from December through March
Hazard of water erosion in bare areas: None or low

Contrasting Inclusions

• The poorly drained Lasvar soils, which are 20 to 40 inches deep to a hardpan; on foot slopes
• The somewhat poorly drained Patburn soils, which have more than 35 percent clay in the subsoil; on foot slopes
• The somewhat poorly drained Pitvar soils, which are 40 to 60 inches deep to a hardpan; on the lower toe slopes

Use and Management

Land use: Irrigated crops, livestock grazing, or wetland wildlife habitat

Irrigated crops

Common crops: Grass-legume hay and wild rice
Major management factors: Ponding, high water table, slow permeability, short growing season
Management considerations:
• The high water table, the ponding, and the short growing season can impact crop selections, the tillage period, and equipment use.

• Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.

Livestock grazing

Common plants: Tules, rushes, and sedges
Major management factors: High water table, shrink-swell
Management considerations:
• Equipment use and livestock trampling can damage the soil and vegetation during periods when the water table is high.
• The high water table in the spring can have a detrimental effect on desirable forage species.
• If seeding is desired, species that are adapted to a high water table and a high shrink-swell potential should be selected.
• Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Wetland wildlife habitat

Management considerations:
• This unit can provide important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
• Drainage of wetlands in areas of this unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: Vw, irrigated and nonirrigated
MLRA: 22
Prime farmland: Considered prime farmland only in drained areas

318—Swanberger muck, 0 to 1 percent slopes

Setting

Landform: Basins
Elevation: 4,200 to 4,800 feet
Slope range: 0 to 1 percent
Vegetation: Tules, rushes, and sedges
Mean annual precipitation: 16 to 25 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Swanberger and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Swanberger Soil

Parent material: Alluvium from mixed volcanic rock
Typical profile:
0 to 5 inches—mottled, very dark gray muck
5 to 15 inches—dark gray clay
15 to 41 inches—gray clay
41 to 45 inches—pale brown silty clay
45 to 75 inches—pale brown clay loam
Depth class: Very deep
Drainage class: Very poorly drained
Slowest permeability class: Slow
Available water capacity: High
Highest shrink-swell potential: High
Surface runoff: Ponded
Depth to bedrock: More than 60 inches
Water table: At the surface to 18 inches below the surface from February through April; at a depth of 18 to 48 inches from May through June; at a depth of 48 to 60 inches from July through August
Kind of water table: Perched
Ponding: 6 inches above the surface for long periods from December through March
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• The somewhat poorly drained Lasvar soils, which are 20 to 40 inches deep to a hardpan; on toe slopes
• The somewhat poorly drained Pitvar soils, which are 40 to 60 inches deep to a hardpan; on toe slopes

Use and Management

Land use: Hay, pasture, or wetland wildlife habitat

Hay and pasture

Major management factors: High water table, soil blowing, shrink-swell
Management considerations:
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.
• Equipment use and livestock trampling can damage the soil and vegetation during periods when the water table is high.
• The high water table limits the choice of crops and cultivars and increases the risk of winterkill.
• Careful management of irrigation is needed to avoid raising the water table.
• If seeding is desired, species that are adapted to a high water table and a high shrink-swell potential should be selected.

• Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Wetland wildlife habitat

Management considerations:
• This unit can provide important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
• Drainage of wetlands in areas of this unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: Vw-2, irrigated and nonirrigated
MLRA: 22
Prime farmland: Considered prime farmland only in drained areas

319—Sweagert loam, 2 to 5 percent slopes

Setting

Landform: Stream terraces
Elevation: 4,200 to 4,800 feet
Slope range: 2 to 5 percent
Vegetation: Grasses and low sagebrush
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 45 to 50 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Sweagert and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Sweagert Soil

Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 7 inches—gray loam
7 to 25 inches—gray clay loam
25 to 35 inches—pale brown and very pale brown clay loam
35 inches—hardpan
Depth class: Moderately deep
Drainage class: Moderately well drained
Slowest permeability class: Moderately slow in the upper part and slow in the lower part
Available water capacity: Moderate
Highest shrink-swell potential: High
Surface runoff: Slow
Depth to hardpan: 20 to 40 inches
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low
Hazard of soil blowing in bare areas: Slight

Contrasting Inclusions

• Dotta soils, which are more than 60 inches deep; on foot slopes
• Modoc soils, which are 20 to 40 inches deep to a hardpan and have more than 35 percent clay in the subsoil; on mounds
• Oxendine soils, which are less than 20 inches deep to a hardpan over weathered bedrock; on mounds

Use and Management

Land use: Livestock grazing or irrigated crops

Livestock grazing

Common plants: Low sagebrush, bluebunch wheatgrass, needlegrass
Major management concerns: None

Irrigated crops

Common crops: Hay, grain, potatoes
Major management factors: Slope, cemented pan
Management considerations:
• Sprinkler irrigation is the most suitable method of applying water.
• Because of the cemented pan, intensive management of water is needed to prevent the buildup of a perched water table. Ripping or subsoiling can permanently enhance the root environment.

Interpretive Groups

Land capability classification: IIIe-8, irrigated and nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Range site: Loamy Mounds, MAP 14-16 (21e)

320—Tionesta very gravelly loamy coarse sand, 2 to 15 percent slopes

Setting

Landform: Hills
Elevation: 5,000 to 5,800 feet
Slope range: 2 to 15 percent
Vegetation: White fir, ponderosa pine, and shrubs
Mean annual precipitation: 25 to 35 inches

Mean annual air temperature: 39 to 44 degrees F
Mean annual soil temperature: 40 to 47 degrees F
Frost-free period: 50 to 80 days

Composition

Tionesta and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Tionesta Soil

Parent material: Tephra
Typical profile:
3 inches to 0—duff
0 to 5 inches—gray, pumiceous very gravelly loamy coarse sand
5 to 15 inches—white, pumiceous extremely gravelly coarse sand
15 to 31 inches—light brown gravelly coarse sandy loam
31 to 53 inches—pink extremely gravelly coarse sandy loam
53 to 70 inches—reddish yellow extremely gravelly loamy coarse sand
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Rapid in the upper part and very rapid in the lower part
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: Greater than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Medici soils, which have medial over loamy-skeletal material; on foot slopes
• Medlake soils, which have pumiceous over medial material; on toe slopes
• Soils that have slopes of more than 15 percent

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: Jeffrey pine, ponderosa pine, white fir, incense cedar, sugar pine
Mean site index for stated species: Jeffrey pine and ponderosa pine—87; white fir—66
Dunning site class: 3
CACTOS site index: 59
Common understory plants: Greenleaf manzanita, squawcarpet, antelope bitterbrush, snowbrush ceanothus, squirreltail

Timber production

Major management factors: Pumiceous material, compaction hazard, plant competition, hazard of fire damage
Management considerations:
• The extremely porous nature of the pumiceous material allows maximum root development for seedlings and tree growth.
• Water bars constructed with pumice can wash out during periods of intense thunderstorms. Constructing the water bars with mineral soil material and building the roads with rolled grades help to control erosion.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir.

Interpretive Groups

Land capability classification: VIs, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 6S

321—Tionesta very gravelly loamy coarse sand, 15 to 30 percent slopes

Setting

Landform: Hills
Elevation: 5,000 to 5,800 feet
Slope range: 15 to 30 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 39 to 44 degrees F
Mean annual soil temperature: 40 to 47 degrees F
Frost-free period: 50 to 80 days

Composition

Tionesta and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Tionesta Soil

Parent material: Tephra

Typical profile:
3 inches to 0—duff
0 to 5 inches—gray, pumiceous very gravelly loamy coarse sand
5 to 15 inches—white, pumiceous extremely gravelly coarse sand
15 to 31 inches—light brown gravelly coarse sandy loam
31 to 53 inches—pink extremely gravelly coarse sandy loam
53 to 70 inches—reddish yellow extremely gravelly loamy coarse sand
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Rapid in the upper part and very rapid in the lower part
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Medici soils, which have medial over loamy-skeletal material; on back slopes
• The somewhat excessively drained Medlake soils, which have pumiceous over medial material; on foot slopes
• Soils that have slopes of less than 15 percent

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, ponderosa pine, incense cedar, sugar pine
Mean site index for stated species: White fir—66; ponderosa pine—87
Dunning site class: 3
CACTOS site index: 59
Common understory plants: Snowbrush ceanothus, greenleaf manzanita, antelope bitterbrush, squawcarpet, squirreltail

Timber production

Major management factors: Pumiceous material, water erosion, compaction hazard, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The extremely porous nature of the pumiceous material allows maximum root development for seedlings and tree growth.
• Roads and landings can be protected from erosion by constructing water bars.
• Water bars constructed with pumice can wash out during periods of intense thunderstorms. Constructing the water bars with mineral soil material and building the roads with rolled grades help to control erosion.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir.

Interpretive Groups

Land capability classification: VIs, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 6S

322—Trojan-Erig complex, 15 to 30 percent slopes

Setting

Landform: Hills
Elevation: 5,800 to 6,500 feet
Slope range: 15 to 30 percent
Vegetation: Juniper, scattered conifers, and sagebrush
Mean annual precipitation: 20 to 25 inches
Mean annual air temperature: 39 to 44 degrees F
Mean annual soil temperature: 41 to 46 degrees F

Frost-free period: 50 to 80 days

Composition

Trojan and similar soils: 55 percent
Erig and similar soils: 30 percent
Contrasting inclusions: 15 percent

Characteristics of the Trojan Soil

Position on the landscape: South-facing side slopes
Parent material: Slope alluvium from extrusive igneous rock
Typical profile:
2 inches to 0—duff
0 to 4 inches—grayish brown loam
4 to 14 inches—grayish brown cobbly loam
14 to 31 inches—dark brown gravelly clay loam
31 to 48 inches—brown extremely gravelly clay loam
48 inches—tuff
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Moderate
Surface runoff: Medium or rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Moderate or high

Characteristics of the Erig Soil

Position on the landscape: North-facing side slopes
Parent material: Colluvium from extrusive igneous rock
Typical profile:
0 to 19 inches—dark grayish brown gravelly loam
19 to 48 inches—dark brown and yellowish brown very cobbly clay loam
48 inches—hard conglomerate tuff
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Medium or rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Moderate or high

Contrasting Inclusions

• Soils that have slopes of more than 50 percent
• Soils that are similar to the Erig soil but are 20 to 40 inches deep to bedrock; on back slopes
• Soils that are similar to the Erig soil but have less than 35 percent rock fragments in the subsoil; on foot slopes
• Soils that are similar to the Trojan soil but have more than 35 percent rock fragments in the subsoil; on back slopes

Use and Management

Land use: Wood products or grazing

Woodland vegetation on the Trojan soil

Main woodland species: Jeffrey pine, western juniper
Mean site index for stated species: Jeffrey pine—82
Dunning site class: 3
CACTOS site index: 53
Common understory plants: Mountain big sagebrush, bluebunch wheatgrass, arrowleaf balsamroot, Idaho fescue, bottlebrush squirreltail, mountainmahogany

Woodland vegetation on the Erig soil

Main woodland species: Jeffrey pine, white fir, western juniper, California black oak
Mean site index for stated species: Jeffrey pine—72
Dunning site class: 4
CACTOS site index: 48
Common understory plants: Curlleaf mountainmahogany, lupine, gooseberry, snowberry, serviceberry, Idaho fescue, bluegrass, squirreltail

Wood products

Major management factors: Water erosion, rock fragments, compaction hazard, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 70 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• The rock fragments in the profile hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, is beneficial for the productivity and nutrient balance of the site. A

balance between fire hazard reduction and long-term productivity should be considered.

Woodland grazing

Major management factors: Water erosion
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 70 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.

Interpretive Groups

Land capability classification: Trojan—IVe-7, nonirrigated; Erig—IVe-4, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Trojan—5A; Erig—4F

323—Twinbuttes very gravelly coarse sandy loam, 30 to 50 percent slopes

Setting

Landform: Cindercones
Elevation: 4,600 to 5,200 feet
Slope range: 30 to 50 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 35 to 45 inches
Mean annual air temperature: 39 to 41 degrees F
Mean annual soil temperature: 42 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Twinbuttes and similar soils: 90 percent
Contrasting inclusions: 10 percent

Characteristics of the Twinbuttes Soil

Parent material: Tephra
Typical profile:
1 inch to 0—duff
0 to 3 inches—yellowish brown, cindery very gravelly coarse sandy loam
3 to 7 inches—brown, cindery extremely gravelly coarse sandy loam
7 to 34 inches—strong brown and reddish yellow, cindery extremely gravelly coarse sandy loam
34 to 49 inches—brownish yellow, cindery extremely gravelly loamy coarse sand and extremely gravelly coarse sandy loam
49 to 72 inches—very dark gray, cindery extremely gravelly coarse sand
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability class: Rapid in the upper part and very rapid in the lower part
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: Greater than 60 inches
Hazard of water erosion in bare areas: Moderate or high

Contrasting Inclusions

• Rock outcrops; on shoulders
• Soils that have slopes of less than 30 percent
• Wengler soils, which have ashy-skeletal material throughout; on foot slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, Jeffrey pine, ponderosa pine, sugar pine, incense cedar
Mean site index for stated species: White fir—56; Jeffrey pine and ponderosa pine—100
Dunning site class: 2
CACTOS site index: 63
Common understory plants: Antelope bitterbrush, greenleaf manzanita, snowbrush ceanothus, gooseberry, squawcarpet

Timber production

Major management factors: Cindery material, water erosion, slope, coarse texture, compaction hazard, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Because the thin and loose surface layer can be easily displaced by tracked or wheeled equipment, revegetation may be difficult.
• Special yarding practices, such as end lining or helicopter logging, may be necessary.
• If areas of this soil are disturbed, soil displacement occurs as dry ravel where slopes are greater than 40 percent. The use of equipment during dry periods should be carefully planned.
• Roads and landings can be protected from erosion by constructing water bars.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.

• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• The slope limits the kinds of equipment that can be used in forest management.
• The coarse texture throughout the profile hinders the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir, Jeffrey pine, ponderosa pine, and sugar pine.

Interpretive Groups

Land capability classification: VIIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 7R

324—Twinbuttes-Lava flows complex, 2 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 4,600 to 4,800 feet
Slope range: 2 to 15 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 35 to 45 inches
Mean annual air temperature: 39 to 41 degrees F
Mean annual soil temperature: 42 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Twinbuttes and similar soils: 60 percent
Lava flows: 20 percent
Contrasting inclusions: 20 percent

Characteristics of the Twinbuttes Soil

Position on the landscape: Between lava flow outcrops
Parent material: Tephra
Typical profile:
1 inch to 0—duff
0 to 3 inches—yellowish brown, cindery very gravelly coarse sandy loam
3 to 7 inches—brown, cindery extremely gravelly coarse sandy loam
7 to 34 inches—strong brown and reddish yellow, cindery extremely gravelly coarse sandy loam
34 to 49 inches—brownish yellow, cindery extremely gravelly loamy coarse sand and extremely gravelly coarse sandy loam
49 to 72 inches—very dark gray, cindery extremely gravelly coarse sand
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability class: Rapid in the upper part and very rapid in the lower part
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: Greater than 60 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Lava Flows

• Lava flows consist of areas covered by geologically recent lava. They are characterized by sharp, jagged, broken blocks piled in tumbled heaps and have many crevices, sinkholes, and collapsed lava tubes. Most areas are vegetated by such plants as ponderosa pine, antelope bitterbrush, greenleaf manzanita, and Modoc cypress, but some areas are virtually devoid of vegetation.

Contrasting Inclusions

• Carberry soils, which are 40 to 60 inches deep to hard bedrock; on the edges of lava flow outcrops
• Dekkas soils, which have ashy over sandy or sandy-skeletal material; between lava flow outcrops on toe slopes
• Wengler soils, which have ashy-skeletal material throughout; between lava flow outcrops on toe slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Twinbuttes soil

Main tree species: White fir, Jeffrey pine, ponderosa pine, sugar pine, incense cedar
Mean site index for stated species: White fir—56; Jeffrey pine and ponderosa pine—100
Dunning site class: 2
CACTOS site index: 63
Common understory plants: Greenleaf manzanita, antelope bitterbrush, snowbrush ceanothus, gooseberry, squawcarpet

Timber production

Major management factors: Twinbuttes—cindery material, plant competition, hazard of fire damage; Lava flows—rock fragments, depth to rock
Management considerations:
• Because the thin and loose surface layer can be easily displaced by tracked or wheeled equipment, revegetation may be difficult.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• The Lava flows tend to interfere with felling and yarding and with other uses of equipment. Harvesting should be planned so that vehicular traffic is limited in the areas of Lava flows.
• Trees suitable for planting include white fir, Jeffrey pine, ponderosa pine, and sugar pine.

Interpretive Groups

Land capability classification: Twinbuttes—VIIe, nonirrigated; Lava flows—VIII, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Twinbuttes—7F

325—Wengler very gravelly coarse sandy loam, 5 to 15 percent slopes

Setting

Landform: Lava plateaus
Elevation: 4,600 to 5,800 feet
Slope range: 5 to 15 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 35 to 45 inches
Mean annual air temperature: 39 to 41 degrees F
Mean annual soil temperature: 42 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Wengler and similar soils: 80 percent
Contrasting inclusions: 20 percent

Characteristics of the Wengler Soil

Parent material: Tephra deposited over basaltic lava flows
Typical profile:
0 to 12 inches—brown very gravelly coarse sandy loam
12 to 17 inches—light brown very gravelly coarse sandy loam
17 to 25 inches—light brown extremely gravelly loamy coarse sand
25 to 47 inches—yellowish brown extremely gravelly sand
47 to 80 inches—yellowish brown extremely gravelly loamy coarse sand
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability class: Rapid in the upper part and very rapid in the lower part
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Medium
Depth to bedrock: Greater than 60 inches
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Carberry soils, which are 40 to 60 inches deep to hard bedrock and have medial over loamy-skeletal material; on foot slopes
• Dekkas soils, which have ashy over sandy or sandy-skeletal material throughout; on toe slopes
• Lava flow outcrops; on shoulders
• Twinbuttes soils, which have medial-skeletal material throughout; on toe slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, sugar pine, Douglas-fir, incense cedar, ponderosa pine
Mean site index for stated species: White fir—56; ponderosa pine—99
Dunning site class: 2
CACTOS site index: 63
Common understory plants: Snowbrush ceanothus, antelope bitterbrush, squawcarpet, greenleaf manzanita, needlegrass

Timber production

Major management factors: Compaction hazard, plant competition, hazard of fire damage
Management considerations:
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir, sugar pine, and ponderosa pine.

Interpretive Groups

Land capability classification: IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 8F

326—Wengler very gravelly coarse sandy loam, 15 to 30 percent slopes

Setting

Landform: Hills
Elevation: 4,600 to 5,800 feet
Slope range: 15 to 30 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 35 to 45 inches
Mean annual air temperature: 39 to 41 degrees F
Mean annual soil temperature: 42 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Wengler and similar soils: 80 percent
Contrasting inclusions: 20 percent

Characteristics of the Wengler Soil

Parent material: Tephra deposited over basaltic lava flows
Typical profile:
0 to 12 inches—brown very gravelly coarse sandy loam
12 to 17 inches—light brown very gravelly coarse sandy loam
17 to 25 inches—light brown extremely gravelly loamy coarse sand
25 to 47 inches—yellowish brown extremely gravelly sand
47 to 80 inches—yellowish brown extremely gravelly loamy coarse sand
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability class: Rapid in the upper part and very rapid in the lower part
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: Greater than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Carberry soils, which are 40 to 60 inches deep to hard bedrock and have medial over loamy-skeletal material; on back slopes
• Lava flow outcrops; on shoulders
• Twinbuttes soils, which have medial-skeletal material throughout; on foot slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, Douglas-fir, sugar pine, incense cedar, ponderosa pine
Mean site index for stated species: White fir—56; ponderosa pine—99
Dunning site class: 2
CACTOS site index: 63
Common understory plants: Squawcarpet, greenleaf

manzanita, needlegrass, snowbrush ceanothus, antelope bitterbrush

Timber production

Major management factors: Water erosion, compaction hazard, fire damage, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir, sugar pine, and ponderosa pine.

Interpretive Groups

Land capability classification: IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 8F

327—Wengler very gravelly coarse sandy loam, 30 to 50 percent slopes

Setting

Landform: Hills
Elevation: 4,600 to 5,800 feet
Slope range: 30 to 50 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 35 to 45 inches
Mean annual air temperature: 39 to 41 degrees F
Mean annual soil temperature: 42 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Wengler and similar soils: 80 percent
Contrasting inclusions: 20 percent

Characteristics of the Wengler Soil

Parent material: Tephra deposited over basaltic lava flows
Typical profile:
0 to 12 inches—brown very gravelly coarse sandy loam
12 to 17 inches—light brown very gravelly coarse sandy loam
17 to 25 inches—light brown extremely gravelly loamy coarse sand
25 to 47 inches—yellowish brown extremely gravelly sand
47 to 80 inches—yellowish brown extremely gravelly loamy coarse sand
Depth class: Very deep
Drainage class: Somewhat excessively drained
Slowest permeability class: Rapid in the upper part and very rapid in the lower part
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate or high

Contrasting Inclusions

• Carberry soils, which are 40 to 60 inches deep to hard bedrock; on back slopes
• Lava flow outcrops; on shoulders
• Twinbuttes soils, which have ashy-skeletal material; on foot slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: White fir, Douglas-fir, incense cedar, sugar pine, ponderosa pine
Mean site index for stated species: White fir—56; ponderosa pine—99
Dunning site class: 2
CACTOS site index: 63
Common understory plants: Squawcarpet, greenleaf

manzanita, needlegrass, snowbrush ceanothus, antelope bitterbrush

Timber production

Major management factors: Water erosion, slope, rock fragments, compaction hazard, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 60 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• The slope limits the kinds of equipment that can be used in forest management.
• The rock fragments in the profile hinder planting efforts in areas where the subsoil is exposed or disturbed. The proper tools and techniques should be used.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir, sugar pine, and ponderosa pine.

Interpretive Groups

Land capability classification: VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 8R

328—Whipp-Cupvar complex, 0 to 2 percent slopes

Setting

Landform: Basins
Elevation: 3,600 to 4,200 feet
Slope range: 0 to 2 percent
Vegetation: Grasses and sagebrush
Mean annual precipitation: 14 to 20 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 50 to 52 degrees F
Frost-free period: 100 to 120 days

Composition

Whipp and similar soils: 60 percent
Cupvar and similar soils: 25 percent
Contrasting inclusions: 15 percent

Characteristics of the Whipp Soil

Position on the landscape: Foot slopes
Parent material: Mixed alluvium
Typical profile:
0 to 1 inch—dark grayish brown silt loam
1 to 3 inches—very dark grayish brown silty clay loam
3 to 16 inches—very dark grayish brown and dark grayish brown silty clay
16 to 22 inches—dark grayish brown silty clay loam
22 to 25 inches—hardpan
25 to 60 inches—dark yellowish brown and dark grayish brown fine sandy loam
Depth class: Moderately deep
Drainage class: Poorly drained
Slowest permeability class: Slow
Available water capacity: Low
Salinity: 0 to 2 mmhos/cm from 0 to 22 inches
Sodicity (SAR): 5 to 15 from 0 to 1 inch; 10 to 15 from 1 to 3 inches; 15 to 25 from 3 to 16 inches; 15 to 20 from 16 to 22 inches
Highest shrink-swell potential: High
Surface runoff: Very slow
Depth to claypan: 5 to 10 inches
Depth to hardpan: 20 to 40 inches
Depth to bedrock: More than 60 inches
Frequency of flooding: Frequent for long periods from December through February
Water table: At the surface to 24 inches below the surface from November through April
Kind of water table: Perched

Hazard of water erosion in bare areas: Low

Characteristics of the Cupvar Soil

Position on the landscape: Toe slopes
Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 21 inches—dark grayish brown silty clay
21 to 25 inches—hardpan
25 to 64 inches—light yellowish brown fine sandy loam
Depth class: Moderately deep
Drainage class: Moderately well drained
Slowest permeability class: Slow
Available water capacity: High
Highest shrink-swell potential: High
Surface runoff: Ponded
Depth to hardpan: 20 to 40 inches
Depth to bedrock: More than 60 inches
Depth to the water table: 6 to 12 inches from December through February; 18 to 48 inches from March through May; 48 to 72 inches from June through October
Kind of water table: Perched
Ponding: 6 inches above the surface for brief periods from December through January
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Dudgen soils, which are less than 20 inches deep to a hardpan and have an argillic horizon; in intermounds
• Graven soils, which are 20 to 40 inches deep to a hardpan and have an argillic horizon; on mounds
• The very poorly drained Pastolla soils, which are more than 60 inches deep; on toe slopes
• Soils that are less than 20 inches deep to a hardpan; on toe slopes

Use and Management

Land use: Irrigated crops, pasture, or wetland wildlife habitat

Irrigated crops

Common crops: Grass-legume hay and barley
Major management factors: Whipp—soil blowing, depth to the claypan, cemented pan, high water table, surface crusting, sodicity and salinity, slow permeability; Cupvar—cemented pan, high water table, slow permeability
Management considerations:
• Soil blowing can be controlled by keeping the soil rough, using emergency tillage, stripcropping, and establishing windbreaks.
• Chiseling or subsoiling of the claypan can provide temporary benefits from improved water and air movement and root penetration.
• Because of the restricted permeability, proper irrigation management is needed to prevent stand deterioration.
• On soils that have a cemented pan, intensive management of irrigation water is needed to prevent the buildup of a perched water table. Ripping or subsoiling can permanently enhance the root environment.
• The high water table can damage deep-rooted crops.
• Careful management of irrigation is needed to avoid raising the water table.
• Surface crusting can greatly reduce the water infiltration rate and hinder seedling emergence. Crusting can be minimized by returning crop residue to the soil and using frequent, light applications of irrigation water.
• The sodicity and salinity can be overcome by toxic salt reduction, application of soil amendments, or both.
• High salt levels and a high pH level increase cropping limitations. This unit has potential for the development of wetland wildlife habitat.
• Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.

Pasture

Major management factors: Whipp—soil blowing, high water table, surface crusting, sodicity; Cupvar—high water table, shrink-swell
Management considerations:
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.
• The high water table saturates the soil in winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
• The high water table limits the choice of plant species that can be used for seeding. Frequency, intensity, and duration of grazing affect the composition of the plant community.
• Surface crusting can greatly reduce the water infiltration rate and hinder seedling emergence. Livestock can be used to break crusts. Maintaining a cover of vegetation minimizes surface crusting.
• Forage production is limited by sodicity. If seeding is desired, species that are adapted to a high content of sodium should be considered.
• If seeding is desired, species that are adapted to a high shrink-swell potential should be considered.
• Deferring grazing by livestock in areas that support

herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Wetland wildlife habitat

Management considerations:

• This unit can provide important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.

• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.

• Drainage of wetlands in areas of this unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: Whipp and Cupvar—IVw-2, irrigated and nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland

329—Whipp-Cupvar complex, slightly saline, 0 to 2 percent slopes

Setting

Landform: Basins
Elevation: 3,600 to 4,200 feet
Slope range: 0 to 2 percent
Vegetation: Grasses and sagebrush
Mean annual precipitation: 14 to 20 inches
Mean annual air temperature: 48 to 50 degrees F
Mean annual soil temperature: 50 to 52 degrees F
Frost-free period: 100 to 120 days

Composition

Whipp and similar soils: 60 percent
Cupvar and similar soils: 25 percent
Contrasting inclusions: 15 percent

Characteristics of the Whipp Soil

Position on the landscape: Foot slopes
Parent material: Mixed alluvium
Typical profile:
0 to 1 inch—dark grayish brown silt loam
1 to 3 inches—very dark grayish brown silty clay loam
3 to 16 inches—very dark grayish brown and dark grayish brown silty clay
16 to 22 inches—dark grayish brown silty clay loam
22 to 25 inches—hardpan
25 to 60 inches—dark yellowish brown and dark grayish brown fine sandy loam
Depth class: Moderately deep
Drainage class: Poorly drained
Slowest permeability class: Slow
Available water capacity: Low
Salinity: 0 to 2 mmhos/cm from 0 to 22 inches
Sodicity (SAR): 5 to 15 from 0 to 1 inch; 10 to 15 from 1 to 3 inches; 15 to 25 from 3 to 16 inches; 15 to 20 from 16 to 22 inches
Highest shrink-swell potential: High
Surface runoff: Very slow or slow
Depth to claypan: 5 to 10 inches
Depth to hardpan: 20 to 40 inches
Depth to bedrock: More than 60 inches
Frequency of flooding: Frequent for long periods from December through February
Water table: At the surface to 24 inches below the surface from November through April; at a depth of 24 to 48 inches from May through July; at a depth of 48 to 72 inches from August through October
Kind of water table: Perched
Hazard of water erosion in bare areas: Low

Characteristics of the Cupvar Soil

Position on the landscape: Toe slopes
Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 28 inches—dark grayish brown and pale yellow silty clay
28 to 41 inches—hardpan
41 to 60 inches—brown fine sandy loam
Depth class: Moderately deep
Drainage class: Moderately well drained
Slowest permeability class: Slow
Available water capacity: Moderate
Highest shrink-swell potential: High
Surface runoff: Ponded
Depth to hardpan: 20 to 40 inches
Depth to bedrock: More than 60 inches
Depth to the water table: 6 to 12 inches from December through February; 12 to 48 inches from March through May; 48 to 72 inches from June through November
Kind of water table: Perched
Ponding: 6 inches above the surface for brief periods from December through January
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Dudgen soils, which are less than 20 inches deep to a hardpan and have more than 35 percent clay in the subsoil; in intermounds

• Graven soils, which are 20 to 40 inches deep and

have more than 35 percent clay in the subsoil; on mounds
• Soils that are less than 20 inches deep to a hardpan; on toe slopes

Use and Management

Land use: Irrigated crops, livestock grazing, or wetland wildlife habitat

Irrigated crops

Common crops: Grass-legume hay and barley
Major management factors: Whipp—soil blowing, depth to the claypan, cemented pan, high water table, surface crusting, sodicity and salinity, slow permeability; Cupvar—cemented pan, high water table, slow permeability
Management considerations:
• Soil blowing can be controlled by keeping the soil rough, using emergency tillage, stripcropping, and establishing windbreaks.
• Chiseling or subsoiling of the claypan can provide temporary benefits from improved water and air movement and root penetration.
• Because of the restricted permeability, proper irrigation management is needed to prevent stand deterioration.
• On soils that have a cemented pan, intensive management of irrigation water is needed to prevent the buildup of a perched water table. Ripping or subsoiling can permanently enhance the root environment.
• The high water table can damage deep-rooted crops.
• Careful management of irrigation is needed to avoid raising the water table.
• Surface crusting can greatly reduce the water infiltration rate and hinder seedling emergence. Crusting can be minimized by returning crop residue to the soil and using frequent, light applications of irrigation water.
• The sodicity and salinity can be overcome by toxic salt reduction, application of soil amendments, or both.
• High salt levels and a high pH increase cropping limitations. This unit has potential for the development of wetland wildlife habitat.
• Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.

Livestock grazing

Common plants on the Whipp soil: Saltgrass, onespike oatgrass, low sagebrush
Common plants on the Cupvar soil: Nevada bluegrass, bottlebrush squirreltail, silver sagebrush
Major management factors: Whipp—soil blowing, high water table, ponding, surface crusting, sodicity; Cupvar—high water table, ponding, shrink-swell
Management considerations:
• Maintaining a cover of vegetation helps to prevent the damage caused by soil blowing.
• The high water table saturates the soil in winter and early spring. When the soil is saturated, equipment use and livestock trampling can damage the soil and vegetation.
• Forage production is limited by the high water table, ponding, sodicity, and the high shrink-swell potential. These factors limit the choice of plant species. Grazing frequency and duration can affect the dominance of hydrophytic plants.
• Surface crusting can greatly reduce the water infiltration rate and hinder seedling emergence. Livestock can be used to break crusts. Maintaining a cover of vegetation minimizes surface crusting.
• Deferring grazing by livestock in areas that support herbaceous vegetation and that are adjacent to wetlands improves nesting cover for waterfowl.

Wetland wildlife habitat

Management considerations:
• This unit can provide important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
• Drainage of wetlands in areas of this unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: Whipp and Cupvar—IVw-2, irrigated and nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland

330—Winnibulli loam, 0 to 2 percent slopes

Setting

Landform: Fan terraces
Elevation: 3,300 to 4,500 feet
Slope range: 0 to 2 percent
Vegetation: Ponderosa pine and grasses
Mean annual precipitation: 25 to 35 inches

Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 49 degrees F
Frost-free period: 80 to 100 days

Composition

Winnibulli and similar soils: 80 percent
Contrasting inclusions: 20 percent

Characteristics of the Winnibulli Soil

Parent material: Alluvium from extrusive igneous rock
Typical profile:
2 inches to 0—duff
0 to 11 inches—dark brown loam
11 to 55 inches—reddish brown, brown, and light yellowish brown clay loam
55 to 72 inches—light gray and pink sandy clay loam
72 to 87 inches—very dark gray sandy loam
Depth class: Very deep
Drainage class: Somewhat poorly drained
Slowest permeability class: Slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Frequency of flooding: Occasional for long periods from January through April
Depth to the water table: 18 to 42 inches from December through April
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• The well drained Gasper soils, which have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on foot slopes
• Nosoni soils near stream channels
• Pitvar soils, which are 40 to 60 inches deep to a hardpan; on the lower toe slopes
• The well drained Scarface soils, which have less than 35 percent clay in the subsoil; on foot slopes

Use and Management

Land use: Timber production, irrigated crops, or homesite development

Woodland vegetation

Main tree species: Ponderosa pine, Oregon white oak, California black oak
Mean site index for stated species: Ponderosa pine—99
Dunning site class: 2
CACTOS site index: 65
Common understory plants: Thurber needlegrass, squirreltail

Timber production

Major management factors: High water table, compaction hazard, plant competition
Management considerations:
• The high water table limits the survival of native trees and shrubs. Plant roots cannot survive extended periods of high water. Species that are adapted to wet sites, such as willows, cottonwoods, and aspens, should be planted.
• During periods when the water table is near the surface, the use of equipment may be restricted. Culverts can help to overcome this limitation.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include ponderosa pine.

Irrigated crops

Common crops: Alfalfa, barley, wheat, grass-legume hay, pasture
Major management factors: Flooding, high water table, slow permeability
Management considerations:
• The hazard of flooding should be considered before any cropping is done or capital improvements are installed.
• The high water table limits the choice of crops and cultivars, increases the risk of winterkill, and can damage deep-rooted crops.
• Careful management of irrigation is needed to avoid raising the water table.
• Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.

Homesite development

Major management factors: Flooding, wetness, restricted permeability
Management considerations:
• Flooding can occur during the winter and early spring. The foundation should be taller than normal, or the buildings should be constructed at the highest

elevations. Water should be intercepted by drainage ditches, or a drainage system should be developed around the foundation.
• Flooding can add water to the septic system. Diversion of floodwater helps to overcome this limitation.
• The high water table limits the absorption capacity of the leach field. A mounded leach field or other specialized leach field can help to overcome this limitation.
• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: IIIw-4, irrigated, and IIIw-2, nonirrigated
MLRA: 21
Prime farmland: Considered prime farmland only in irrigated areas
Woodland ordination symbol: 7W

331—Winnibulli loam, gravelly substratum, 0 to 5 percent slopes

Setting

Landform: Fan terraces
Elevation: 3,200 to 3,400 feet
Slope range: 2 to 5 percent
Vegetation: Ponderosa pine, oak, shrubs, and grasses
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 49 degrees F
Frost-free period: 80 to 100 days

Composition

Winnibulli and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Winnibulli Soil

Parent material: Alluvium from extrusive igneous rock
Typical profile:
0 to 7 inches—dark grayish brown loam
7 to 15 inches—dark yellowish brown clay loam
15 to 40 inches—brown sandy clay loam
40 to 50 inches—light brown sandy loam
50 to 75 inches—light brown extremely gravelly sandy loam
Depth class: Very deep
Drainage class: Somewhat poorly drained
Slowest permeability class: Slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Frequency of flooding: Occasional for long periods from January through April
Depth to the water table: 24 to 48 inches from December through April
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Contrasting Inclusions

• Jadpor soils, which have more than 35 percent rock fragments and less than 35 percent clay in the subsoil; on foot slopes
• Matquaw soils, which have less than 18 percent clay throughout; near stream channels
• Nosoni soils, which have less than 35 percent clay in the subsoil and have a higher base saturation than the Winnibulli soil; on toe slopes

Use and Management

Land use: Irrigated crops, pasture, or homesite development

Irrigated crops

Common crops: Alfalfa, grass-legume hay, barley, wheat
Major management factors: Slope, flooding, high water table, slow permeability
Management considerations:
• Sprinkler irrigation is the most suitable method of applying water.
• Flooding and the high water table should be considered before any cropping is done or capital improvements are installed.
• The high water table limits the choice of crops and cultivars and increases the risk of winterkill.
• Careful management of irrigation is needed to avoid raising the water table.
• Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.

Pasture

Major management factors: Flooding, high water table
Management considerations:
• Livestock operations can be impaired by flooding in winter and spring.
• Flooding and the high water table should be considered when stand renovation or reestablishment is planned.

• The high water table enhances forage production and extends the green feed period.
• If seeding is desired, species that are adapted to wetness should be considered.

Homesite development

Major management factors: Flooding, wetness, restricted permeability
Management considerations:
• Flooding can occur during the winter and early spring. The foundation should be taller than normal, or the buildings should be constructed at the highest elevations. Water should be intercepted by drainage ditches, or a drainage system should be developed around the foundation.
• The high water table limits the absorption capacity of the leach field. A mounded leach field or other specialized leach field can help to overcome this limitation.
• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: IIIw-2, irrigated and nonirrigated
MLRA: 22
Prime farmland: Considered prime farmland in irrigated areas that are protected from flooding
Woodland ordination symbol: 7W

332—Winnibulli-Burman complex, 0 to 5 percent slopes

Setting

Landform: Fan terraces
Elevation: 3,200 to 4,500 feet
Slope range: 0 to 5 percent
Vegetation: Winnibulli—ponderosa pine and oaks; Burman—rushes, sedges, and grasses
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 49 degrees F
Frost-free period: 80 to 100 days

Composition

Winnibulli and similar soils: 60 percent
Burman and similar soils: 25 percent
Contrasting inclusions: 15 percent

Characteristics of the Winnibulli Soil

Position on the landscape: Foot slopes
Parent material: Alluvium from extrusive igneous rock
Slope: 2 to 5 percent
Typical profile:
2 inches to 0—duff
0 to 11 inches—dark brown loam
11 to 55 inches—reddish brown, brown, and light yellowish brown clay loam
55 to 72 inches—light gray and pink sandy clay loam
72 to 87 inches—very dark gray sandy loam
Depth class: Very deep
Drainage class: Somewhat poorly drained
Slowest permeability class: Slow
Available water capacity: High
Highest shrink-swell potential: Moderate
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Frequency of flooding: Occasional for long periods from January through April
Depth to the water table: 18 to 42 inches from December through April
Kind of water table: Apparent
Hazard of water erosion in bare areas: Low

Characteristics of the Burman Soil

Position on the landscape: Toe slopes
Parent material: Alluvium from extrusive igneous rock
Slope: 0 to 2 percent
Typical profile:
0 to 8 inches—mottled pale brown loam
8 to 33 inches—mottled pale brown and brownish yellow clay loam
33 to 39 inches—hardpan
39 to 72 inches—pale brown sandy loam and mottled light gray silt loam
Depth class: Moderately deep
Drainage class: Somewhat poorly drained
Slowest permeability class: Slow
Available water capacity: Low
Highest shrink-swell potential: High
Surface runoff: Ponded
Depth to claypan: 5 to 10 inches
Depth to hardpan: 20 to 40 inches
Depth to bedrock: More than 60 inches
Water table: At the surface to 18 inches below the surface from December through February; at a depth of 18 to 48 inches from March through April; at a depth of 48 to 72 inches from May through October; at a depth of 18 to 48 inches from March through April
Kind of water table: Perched

Ponding: 6 inches above the surface for long periods from December through March
Hazard of water erosion in bare areas: None or low
Hazard of soil blowing in bare areas: None or low

Contrasting Inclusions

- The somewhat poorly drained Henhill soils, which are more than 60 inches deep and have a dark surface layer more than 20 inches thick; near stream channels
- Pit soils, which are more than 60 inches deep and have clay throughout; near stream channels
- Soils that are similar to the Burman soil but have a subsoil of loam; on mounds
- Soils that are similar to the Winnibulli soil but do not have a weakly cemented pan; on foot slopes

Use and Management

Land use: Timber production, irrigated crops, homesite development, or wetland wildlife habitat

Woodland vegetation on the Winnibulli soil

Main tree species: Ponderosa pine, California black oak, Oregon white oak
Mean site index for stated species: Ponderosa pine—99
Dunning site class: 2
CACTOS site index: 65
Common understory plants: Thurber needlegrass, squirreltail

Vegetation on the Burman soil

Common plants: Rushes, sedges, bluegrass, low sagebrush

Timber production

Major management factors: Winnibulli—high water table, compaction hazard, plant competition; Burman—high water table, compaction hazard
Management considerations:
- The high water table limits the survival of native trees and shrubs. Plant roots cannot survive extended periods of high water. Species that are adapted to wet sites, such as willows, cottonwoods, and aspens, should be planted.
- During periods when the water table is near the surface, the use of equipment may be restricted. Culverts can help to overcome this limitation.
- The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
- Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
- Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
- Trees suitable for planting include ponderosa pine.

Irrigated crops

Common crops: Alfalfa, grass-legume hay, barley, wheat
Major management factors: Winnibulli—slope, flooding, high water table, slow permeability; Burman—depth to the claypan, cemented pan, ponding, high water table, slow permeability
Management considerations:
- Sprinkler irrigation is the most suitable method of applying water.
- Chiseling or subsoiling of the claypan can provide temporary benefits from improved water and air movement and root penetration.
- Because of the restricted permeability, proper irrigation management is needed to prevent stand deterioration.
- On soils that have a cemented pan, intensive management of irrigation water is needed to prevent the buildup of a perched water table. Ripping or subsoiling can permanently enhance the root environment.
- The hazard of flooding should be considered before any cropping is done or capital improvements are installed.
- Soil wetness or ponding can impact crop selections, the tillage period, and equipment use.
- The high water table limits the choice of crops and cultivars and increases the risk of winterkill.
- Because of the restricted permeability, an irrigation design that includes low application rates and a long application period is needed.

Homesite development

Major management factors: Winnibulli—flooding, wetness, restricted permeability; Burman—cemented pan, flooding, wetness
Management considerations:
- Flooding can occur during the winter and early spring. The foundation should be taller than normal, or the buildings should be constructed at the highest elevations. Water should be intercepted by drainage ditches, or a drainage system should be developed around the foundation.
- The cemented pan reduces the volume of soil that

is available for filtering effluent. Tests should be made below the pan depth to determine whether the lines should be placed at this depth.
• Flooding can add water to the septic system. Diversion of floodwater helps to overcome this limitation.
• The high water table limits the absorption capacity of the leach field. A mounded septic system or other specialized leach field can help to overcome this limitation.
• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Wetland wildlife habitat

Management considerations:
• This unit can provide important wetland habitat for waterfowl. During spring and fall migrations, it provides habitat for courting, breeding, nesting, brooding, feeding, and loafing.
• Valuable wetland habitat can be created in areas of this unit. Establishing plants for food and cover, constructing islands, and properly managing water promote the reproduction of waterfowl.
• Drainage of wetlands in areas of this unit may be prohibited by local, State, or Federal law.

Interpretive Groups

Land capability classification: Winnibulli—IIIw-2, irrigated and nonirrigated; Burman—IIIw-2, irrigated, and IVw-2, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Winnibulli—7W

333—Witcher-Gosch complex, 2 to 15 percent slopes

Setting

Landform: Mountains
Elevation: 4,600 to 6,500 feet
Slope range: 2 to 15 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 18 to 20 inches
Mean annual air temperature: 40 to 45 degrees F
Mean annual soil temperature: 41 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Witcher and similar soils: 50 percent
Gosch and similar soils: 35 percent
Contrasting inclusions: 15 percent

Characteristics of the Witcher Soil

Position on the landscape: Foot slopes
Parent material: Tephra
Typical profile:
2 inches to 0—duff
0 to 4 inches—brown sandy loam
4 to 36 inches—brown sandy clay loam
36 to 47 inches—brown very gravelly clay loam
47 inches—weathered andesite
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Gosch Soil

Position on the landscape: Foot slopes
Parent material: Tephra
Typical profile:
1 inch to 0—duff
0 to 3 inches—brown gravelly sandy loam
3 to 9 inches—brown extremely stony sandy loam
9 to 32 inches—brown extremely stony sandy clay loam and extremely stony clay loam
32 to 50 inches—brown extremely gravelly clay loam
50 inches—weathered andesite
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Slow or medium
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Gosch soils that have stony textures throughout; on foot slopes
• Rock outcrop; on shoulders
• Soils that are less than 20 inches deep; on shoulders

• Soils that are less than 40 inches deep to bedrock; on foot slopes

Use and Management

Land use: Timber production or homesite development

Woodland vegetation on the Witcher soil

Main tree species: White fir, Jeffrey pine, ponderosa pine, incense cedar
Mean site index for stated species: White fir—43; Jeffrey pine and ponderosa pine—79
Dunning site class: 3
CACTOS site index: 54
Common understory plants: Greenleaf manzanita, squawcarpet, bitter cherry, Sierra chinkapin, snowbrush ceanothus, serviceberry

Woodland vegetation on the Gosch soil

Main tree species: White fir, Jeffrey pine, ponderosa pine, incense cedar
Mean site index for stated species: White fir—50; Jeffrey pine and ponderosa pine—76
Dunning site class: 3
CACTOS site index: 55
Common understory plants: Greenleaf manzanita, squawcarpet, bitter cherry, Sierra chinkapin, snowbrush ceanothus

Timber production

Major management factors: Witcher—water erosion, compaction hazard, plant competition; Gosch—water erosion, compaction hazard, limited available water capacity, plant competition
Management considerations:
• Roads and landings can be protected from erosion by constructing water bars.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 20 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Trees suitable for planting include white fir.

Homesite development

Major management factors: Slope, restricted permeability
Management considerations:
• During construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.
• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the absorption field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Witcher—IVe-4, nonirrigated; Gosch—VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Witcher—5C; Gosch—4F

334—Witcher-Gosch complex, 15 to 30 percent slopes

Setting

Landform: Mountains
Elevation: 4,600 to 6,500 feet
Slope range: 15 to 30 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 18 to 20 inches
Mean annual air temperature: 40 to 45 degrees F
Mean annual soil temperature: 41 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Witcher and similar soils: 45 percent
Gosch and similar soils: 40 percent
Contrasting inclusions: 15 percent

Characteristics of the Witcher Soil

Position on the landscape: Side slopes
Parent material: Tephra
Typical profile:
2 inches to 0—duff
0 to 4 inches—brown sandy loam
4 to 36 inches—brown sandy clay loam

36 to 47 inches—brown very gravelly clay loam
47 inches—weathered andesite
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Moderate

Characteristics of the Gosch Soil

Position on the landscape: Back slopes
Parent material: Tephra
Typical profile:
1 inch to 0—duff
0 to 3 inches—brown gravelly sandy loam
3 to 9 inches—brown extremely stony sandy loam
9 to 32 inches—brown extremely stony sandy clay loam and extremely stony clay loam
32 to 50 inches—brown extremely gravelly clay loam
50 inches—weathered andesite
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

• Canyoncreek soils, which have medial over loamy-skeletal material and do not have an argillic horizon; on northeast-facing back slopes
• Hermit soils, which have medial over loamy material; on northeast-facing side slopes
• Rock outcrop; on shoulders
• Soils that have slopes of less than 15 percent
• Soils that are less than 20 inches deep; on shoulders
• Soils that are less than 40 inches deep to bedrock; on shoulders
• Witcher soils that have stony textures throughout; on back slopes

Use and Management

Land use: Timber production or homesite development

Woodland vegetation on the Witcher soil

Main tree species: White fir, Jeffrey pine, ponderosa pine, incense cedar
Mean site index for stated species: White fir—43; Jeffrey pine and ponderosa pine—79
Dunning site class: 3
CACTOS site index: 54
Common understory plants: Greenleaf manzanita, squawcarpet, bitter cherry, Sierra chinkapin, snowbrush ceanothus, serviceberry

Woodland vegetation on the Gosch soil

Main tree species: White fir, Jeffrey pine, ponderosa pine, incense cedar
Mean site index for stated species: White fir—50; Jeffrey pine and ponderosa pine—76
Dunning site class: 3
CACTOS site index: 55
Common understory plants: Greenleaf manzanita, Sierra chinkapin, snowbrush ceanothus, squawcarpet, bitter cherry

Timber production

Major management factors: Witcher—water erosion, compaction hazard, plant competition; Gosch—water erosion, compaction hazard, limited available water capacity, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 50 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir.

Homesite development

Major management factors: Water erosion, slope, restricted permeability
Management considerations:
• Maintaining a permanent ground cover on about 50

percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• During construction, all bare ground should be mulched. Establishing a ground cover helps to prevent excessive erosion during periods of high rainfall.
• If septic tanks are used in steep areas, installing the leach lines on the contour helps to maintain the proper grade.
• The restricted permeability reduces the absorption capacity of the leach fields. Increasing the size of the leach field or using a specially designed system can help to overcome this limitation.
• If the density of homesites increases, a community disposal system should be considered.

Interpretive Groups

Land capability classification: Witcher—IVe-4, nonirrigated; Gosch—VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Witcher—5C; Gosch—4F

335—Wyntoon sandy loam, 2 to 15 percent slopes

Setting

Landform: Fan terraces
Elevation: 3,200 to 4,300 feet
Slope range: 2 to 15 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 47 to 50 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Wyntoon and similar soils: 80 percent
Contrasting inclusions: 20 percent

Characteristics of the Wyntoon Soil

Parent material: Alluvium from extrusive igneous rock
Typical profile:
1 inch to 0—duff
0 to 9 inches—brown sandy loam
9 to 25 inches—brown loam
25 to 49 inches—light brown silty clay loam and clay loam
49 to 74 inches—pink and reddish yellow clay
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Very high
Highest shrink-swell potential: Moderate
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Nanny soils, which are more than 60 inches deep, have more than 35 percent rock fragments in the profile, and do not have an argillic horizon; near stream channels
• Ponto soils, which are more than 60 inches deep and do not have an argillic horizon; on toe slopes
• Riverwash; near stream channels
• Soils that have more than 35 percent rock fragments in the profile; on foot slopes

Use and Management

Land use: Timber production

Woodland vegetation

Main tree species: Jeffrey pine, ponderosa pine, California black oak, white fir, incense cedar, Douglas-fir
Mean site index for stated species: Jeffrey pine and ponderosa pine—113; white fir—75; Douglas-fir—143
Dunning site class: 1
CACTOS site index: 80
Common understory plants: Saskatoon serviceberry, greenleaf manzanita, whitethorn ceanothus, deerbrush, squawcarpet, tanoak, needlegrass

Timber production

Major management factors: Water erosion, compaction hazard, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 40 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material,

such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir, Douglas-fir, and ponderosa pine.

Interpretive Groups

Land capability classification: IIIe-3, nonirrigated
MLRA: 21
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 9A

336—Wyntoon sandy loam, 15 to 30 percent slopes

Setting

Landform: Fan terraces
Elevation: 3,200 to 4,300 feet
Slope range: 15 to 30 percent
Vegetation: Conifers, shrubs, and grasses
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 50 degrees F
Frost-free period: 80 to 100 days

Composition

Wyntoon and similar soils: 85 percent
Contrasting inclusions: 15 percent

Characteristics of the Wyntoon Soil

Parent material: Alluvium from extrusive igneous rock
Typical profile:
1 inch to 0—duff
0 to 9 inches—brown sandy loam
9 to 25 inches—brown loam
25 to 49 inches—light brown silty clay loam and clay loam
49 to 74 inches—pink and reddish yellow clay
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Very high
Highest shrink-swell potential: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

• Soils that are less than 60 inches deep to bedrock; on side slopes
• Soils that have more than 35 percent rock fragments in the profile; on shoulders

Use and Management

Land use: Timber production

Woodland vegetation on the Wyntoon soil

Main tree species: Douglas-fir, white fir, Jeffrey pine, ponderosa pine, incense cedar, California black oak
Mean site index for stated species: Douglas-fir—143; white fir—75; Jeffrey pine and ponderosa pine—113
Dunning site class: 1
CACTOS site index: 80
Common understory plants: Greenleaf manzanita, western serviceberry, whitethorn ceanothus, deerbrush, squawcarpet, tanoak, needlegrass

Timber production

Major management factors: Water erosion, compaction hazard, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 80 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir and Douglas-fir.

Interpretive Groups

Land capability classification: IVe-3, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: 9A

337—Wyntoon-Depner complex, 5 to 15 percent slopes

Setting

Landform: Fan terraces
Elevation: 3,600 to 4,200 feet
Slope range: 5 to 15 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 45 to 48 degrees F
Mean annual soil temperature: 47 to 52 degrees F
Frost-free period: 80 to 100 days

Composition

Wyntoon and similar soils: 50 percent
Depner and similar soils: 40 percent
Contrasting inclusions: 10 percent

Characteristics of the Wyntoon Soil

Position on the landscape: Toe slopes
Parent material: Alluvium from extrusive igneous rock
Typical profile:
1 inch to 0—duff
0 to 9 inches—brown sandy loam
9 to 25 inches—brown loam
25 to 49 inches—light brown silty clay loam and clay loam
49 to 74 inches—pink and reddish yellow clay
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Slow
Available water capacity: Very high
Highest shrink-swell potential: Moderate
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low or moderate

Characteristics of the Depner Soil

Position on the landscape: Foot slopes
Parent material: Tephra
Typical profile:
2 inches to 0—duff
0 to 16 inches—yellowish brown gravelly sandy loam
16 to 37 inches—brown very cobbly sandy loam
37 to 48 inches—light yellowish brown very gravelly sandy loam
48 inches—weathered volcanic breccia
Depth class: Deep
Drainage class: Well drained
Slowest permeability class: Moderately rapid
Available water capacity: Very high
Highest shrink-swell potential: Low
Surface runoff: Medium
Depth to bedrock: 40 to 60 inches
Hazard of water erosion in bare areas: Low or moderate

Contrasting Inclusions

• Neer soils, which are 20 to 40 inches deep to hard bedrock; on foot slopes
• Ponto soils, which are more than 60 inches deep and do not have an argillic horizon; on toe slopes
• Soils that have slopes of more than 15 percent

Use and Management

Land use: Timber production

Woodland vegetation on the Wyntoon soil

Main tree species: White fir, incense cedar, ponderosa pine, sugar pine, Douglas-fir, California black oak
Mean site index for stated species: White fir—75; Jeffrey pine and ponderosa pine—113; Douglas-fir—143
Dunning site class: 1
CACTOS site index: 80
Common understory plants: Greenleaf manzanita, Saskatoon serviceberry, whitethorn ceanothus, deerbrush, squawcarpet, tanoak, needlegrass

Woodland vegetation on the Depner soil

Main tree species: White fir, incense cedar, sugar pine, ponderosa pine, Douglas-fir, California black oak
Mean site index for stated species: White fir—66; Douglas-fir—116
Dunning site class: 2
CACTOS site index: 74
Common understory plants: Serviceberry, wild ginger, princes pine, Pacific dogwood, brackenfern, gooseberry, needlegrass

Timber production

Major management factors: Wyntoon—water erosion, compaction hazard, plant competition; Depner—water erosion, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 30 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water

infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Trees suitable for planting include white fir and Douglas-fir.

Interpretive Groups

Land capability classification: Wyntoon—IIIe-3, nonirrigated; Depner—IIIe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Wyntoon—9A; Depner—10F

338—Zeugirdor-Goulder complex, 15 to 30 percent slopes

Setting

Landform: Lava plateaus and mountains
Elevation: 4,800 to 6,800 feet
Slope range: 15 to 30 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 39 to 44 degrees F
Mean annual soil temperature: 41 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Zeugirdor and similar soils: 55 percent
Goulder and similar soils: 30 percent
Contrasting inclusions: 15 percent

Characteristics of the Zeugirdor Soil

Position on the landscape: Foot slopes
Parent material: Uplifted tephra buried by talus from basaltic lava flows
Typical profile:
2 inches to 0—fresh and slightly decomposed litter of needles and twigs
0 to 11 inches—fragmental material
11 to 17 inches—brown extremely gravelly sandy loam
17 to 26 inches—light brown very gravelly sandy loam
26 to 47 inches—reddish yellow very gravelly sandy clay loam
47 to 85 inches—very pale brown very cobbly sandy clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Goulder Soil

Position on the landscape: Toe slopes
Parent material: Tephra over andesitic lava
Typical profile:
1 inch to 0—duff
0 to 7 inches—brown gravelly sandy loam
7 to 17 inches—brown cobbly sandy loam
17 to 27 inches—brown cobbly loam
27 to 41 inches—brown very cobbly clay loam
41 to 58 inches—brown very gravelly clay loam
58 to 64 inches—brown very bouldery clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate

Contrasting Inclusions

• Carberry soils, which are 40 to 60 inches deep to hard bedrock and do not have an argillic horizon; on back slopes
• Rubble land; on back slopes
• Soils that have slopes of less than 15 percent
• Typic Vitrixerands; on back slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Zeugirdor soil

Main tree species: White fir, incense cedar, California black oak, sugar pine, ponderosa pine, Douglas-fir
Mean site index for stated species: White fir—76
Dunning site class: 1
CACTOS site index: 85
Common understory plants: Greenleaf manzanita, Sierra chinkapin, brackenfern, princes pine, snowberry

Woodland vegetation on the Goulder soil

Main tree species: White fir, sugar pine, ponderosa pine, Douglas-fir, incense cedar, California red fir, California black oak
Mean site index for stated species: White fir—76
Dunning site class: 1
CACTOS site index: 85
Common understory plants: Greenleaf manzanita, snowbrush ceanothus, brackenfern, snowberry, Sierra chinkapin, princes pine, gooseberry

Timber production

Major management factors: Zeugirdor—water erosion, rock fragments, limited available water capacity, plant competition, hazard of fire damage; Goulder—water erosion, compaction hazard, plant competition
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 35 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• The rock fragments in the profile hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir, ponderosa pine, and Douglas-fir.

Interpretive Groups

Land capability classification: Zeugirdor—VIe, nonirrigated; Goulder—IVe-4, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Zeugirdor—13X; Goulder—13F

339—Zeugirdor-Goulder complex, 30 to 50 percent slopes

Setting

Landform: Lava plateaus and mountains
Elevation: 4,800 to 6,800 feet
Slope range: 30 to 50 percent
Vegetation: Mixed conifers and shrubs
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 39 to 44 degrees F
Mean annual soil temperature: 41 to 46 degrees F
Frost-free period: 50 to 80 days

Composition

Zeugirdor and similar soils: 60 percent
Goulder and similar soils: 25 percent
Contrasting inclusions: 15 percent

Characteristics of the Zeugirdor Soil

Position on the landscape: Side slopes
Important surface feature: About 80 to 95 percent of the surface is covered with cobbles and stones.
Parent material: Uplifted tephra buried by talus from basaltic lava flows
Typical profile:
2 inches to 0—fresh and slightly decomposed litter of needles and twigs
0 to 11 inches—fragmental material
11 to 17 inches—brown extremely gravelly sandy loam
17 to 26 inches—light brown very gravelly sandy loam
26 to 47 inches—reddish yellow very gravelly sandy clay loam
47 to 85 inches—very pale brown very cobbly sandy clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: Moderate
Highest shrink-swell potential: Low
Surface runoff: Rapid

Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Low

Characteristics of the Goulder Soil

Position on the landscape: Foot slopes
Parent material: Tephra over andesitic lava
Typical profile:
1 inch to 0—duff
0 to 7 inches—brown gravelly sandy loam
7 to 17 inches—brown cobbly sandy loam
17 to 27 inches—brown cobbly loam
27 to 41 inches—brown very cobbly clay loam
41 to 58 inches—brown very gravelly clay loam
58 to 64 inches—brown very bouldery clay loam
Depth class: Very deep
Drainage class: Well drained
Slowest permeability class: Moderately slow
Available water capacity: High
Highest shrink-swell potential: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Hazard of water erosion in bare areas: Moderate or high

Contrasting Inclusions

• Carberry soils, which are 40 to 60 inches deep to hard bedrock and do not have an argillic horizon; on back slopes
• Rubble land; on back slopes
• Areas that have slopes of less than 30 percent; on back slopes
• Soils that are similar to the Goulder soil but have bedrock at a depth of 20 to 40 inches; on back slopes
• Typic Vitrixerands; on back slopes

Use and Management

Land use: Timber production

Woodland vegetation on the Zeugirdor soil

Main tree species: White fir, Douglas-fir, California black oak, sugar pine, ponderosa pine, incense cedar
Mean site index for stated species: White fir—76
Dunning site class: 1
CACTOS site index: 85
Common understory plants: Greenleaf manzanita, snowberry, Sierra chinkapin, snowbrush ceanothus, Sierra gooseberry

Woodland vegetation on the Goulder soil

Main tree species: White fir, California red fir, California black oak, incense cedar, sugar pine, ponderosa pine, Douglas-fir
Mean site index for stated species: White fir—76
Dunning site class: 1
CACTOS site index: 85
Common understory plants: Greenleaf manzanita, Sierra chinkapin, Sierra gooseberry, snowbrush ceanothus, snowberry

Timber production

Major management factors: Zeugirdor—water erosion, slope, rock fragments, limited available water capacity, plant competition, hazard of fire damage; Goulder—water erosion, slope, compaction hazard, plant competition, hazard of fire damage
Management considerations:
• Maintaining a cover of vegetation, such as low-growing plants, limbs, and duff, on about 45 percent of the surface helps to control erosion during periods of intense rainfall and spring snowmelt.
• Roads and landings can be protected from erosion by constructing water bars.
• Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.
• Erosion can be severe during intense thunderstorms in the summer and during warm storms in the winter when the material below the surface is frozen. Measures that control erosion are needed to prevent soil loss.
• The slope limits the kinds of equipment that can be used in forest management.
• The rock fragments in the profile hinder the establishment of vegetation in areas where the subsoil is exposed or disturbed. Drought-tolerant plants should be considered when these areas are revegetated.
• The limited available water capacity in the upper 24 inches of the soil reduces the seedling survival rate.
• The use of heavy equipment when the soil is moist can result in surface compaction. Compaction reduces porosity, aeration, and the rate of water infiltration and increases the runoff rate. Tracked vehicles tend to cause less surface compaction than vehicles that have rubber tires.
• Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees.
• Maintenance of evenly distributed organic material, such as limbs and needles, improves long-term

productivity and the nutrient balance of the site. A balance between fire hazard reduction and long-term productivity should be considered.
• Intense fire damages the soil by killing beneficial micro-organisms and oxidizing organic matter. Careful planning is needed before any site preparation that involves burning is used.
• Trees suitable for planting include white fir, ponderosa pine, and Douglas-fir.

Interpretive Groups

Land capability classification: Zeugirdor and Goulder—VIe, nonirrigated
MLRA: 22
Prime farmland: Not considered prime farmland
Woodland ordination symbol: Zeugirdor and Goulder—13R

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Prepared by Nick Pappas, area agronomist, Natural Resources Conservation Service

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed for each soil, the system of land capability classification used by the Natural Resources Conservation Service is explained, and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading “Detailed Soil Map Units.” Specific information can be obtained from the local office of the Natural Resources Conservation Service or the University of California Cooperative Extension Service.

Arable soils in the survey area that are suitable for irrigated crops, hayland, and pasture can be limited by a variety of soil characteristics. Cultural and management practices can be used to overcome most limitations. Management practices that minimize erosion, promote soil tilth, allow efficient use of irrigation water, and manage soil salts are needed. Good farmland management can ensure sustained optimum productivity and profits by maintaining favorable soil characteristics, maintaining soil fertility, and assisting in pest management.

Some of the more common farming practices are chiseling and subsoiling, using a conservation cropping sequence, applying a system of conservation tillage, managing crop residue, removing excess water, managing hayland and pasture, leveling irrigation land, managing irrigation water, controlling surface water, reducing the content of toxic salts, maintaining water quality, and controlling water erosion and soil blowing. The use of these and other applicable practices depends upon land use goals, soil characteristics or limitations, crop suitability, and capital investments. Some soil limitations cannot be mitigated or profitably corrected; therefore, land use planning is essential for profitable land use and the prevention of soil degradation. Technical assistance with land use planning and soil-related problems can be obtained from the local Resource Conservation District (RCD), the Natural Resources Conservation Service (NRCS), and the University of California Cooperative Extension Service.

Chiseling and subsoiling are practices that can be used to permanently correct hardpans or to temporarily correct dense or compacted soil layers. Hardpans and dense or compacted soil layers limit the effective rooting depth and affect soil water characteristics. Chiseling (less than 16 inches deep) or subsoiling (deeper than 16 inches) permanently shatters a hardpan and thus increases rooting depth, enhances permeability and internal drainage, and prevents the formation of a perched water table. Soils in the survey area that permanently benefit from chiseling or subsoiling are Dudgen, Graven, Bieber, and Modoc soils. Because the hardpan in these soils is near the surface, a shank can penetrate and shatter the pan.

Temporary benefits can be derived from chiseling or subsoiling in areas of soils that have a clayey subsoil. Benefits are temporary because the clays eventually return to their original status. Examples of claypan soils that could have temporary benefits from chiseling or subsoiling are Esperanza and Patburn soils. Chiseling also provides temporary benefits to soils that have become compacted by cropping or tillage. Most cropland soils can develop compacted layers as a result of cultivation or of tillage during periods of high susceptibility, such as excessively wet periods. If the soil moisture content is near field capacity, the soil is too wet for cultivation. Timing farming activities so that the soil is worked during periods of favorable soil moisture content can minimize the formation of compacted layers. It can also prevent the formation of clods and thus provide a better seedbed. Because of intense cultural practices and management requirements, some crops are more susceptible than others to compaction. In areas where these crops are grown, chiseling the field before the next crop is planted can help to prevent compaction.

A conservation cropping sequence helps to maintain favorable soil conditions for good crop performance and sustained production. This type of management involves consideration of all tillage practices, fertilizer programs, pest-control programs, and crop rotations. All inputs are evaluated and managed for optimum production with minimum soil degradation. Economic benefits are realized through reduced farming expenses and machinery costs. Intensive tillage practices reduce the content of organic matter and destroy soil structure. A low content of organic matter and poor soil structure result in poor soil tilth, a reduced rate of water infiltration, the loss of plant nutrients, and an increased susceptibility to erosion. Crop performance and sustained productivity are seriously affected.

A good cropping sequence includes cultural practices and a crop rotation that offsets the deleterious effects of continuous single cropping. The crops selected for rotation are important considerations. Some crops and their production practices are naturally harmful to soils. Other crops are soil enhancing. Growing strawberry transplants requires considerable tillage and disturbance of the soil. Legumes, such as alfalfa hay, are soil enhancing because they fix nitrogen, require less tillage than other crops, and have permanent root systems. If properly managed, grass hay and pastures can improve soil structure and increase the content of organic matter. A good crop rotation sequence helps to offset most soil degradation resulting from cropping.

A well designed cropping sequence also helps to keep erosion to acceptable levels by maintaining a cover of vegetation or crop residue on the surface during periods of wind and rain. Incorporating crop residue or green manure crops into the soil helps to maintain the content of organic matter. Soil structure, the soil water reservoir, and the storage of nutrients are all affected by the content of organic matter.

Farming with a planned cropping system helps to control weeds and other pests and maximizes the benefits of fertilizers and other chemical inputs. Benefits are achieved by interrupting host-pest relationships and increasing on-farm diversity. Nutrient carryovers are utilized by subsequent crops. Soil nutrients that leach below the root zone of a crop can be intercepted and stored by deep-rooted cover crops and green manure crops and returned to the soil for use by subsequent crops.

A conservation tillage system requires less tillage than conventional methods for controlling weeds, incorporating crop residue into the soil, modifying the soil for favorable air and water movement, and preparing a favorable seedbed. Conservation tillage can range from no-till farming to any system that uses less tillage than conventional tillage. The soils in the soil survey area that are most suited to conservation tillage are coarse textured soils that are susceptible to soil blowing, such as Pastolla soils.

Conservation tillage can reduce production costs. It provides more protection of the soil than conventional tillage, but it requires more intensive management. In order for a conservation tillage system to be successful, careful planning of farming operations is essential. The crop production goals and the conservation effects of the cropping sequence should be evaluated to ensure that the producer’s objectives are met. The interaction between successive tillage operations is an important consideration.

Crop residue management is a very important component of a conservation tillage system. Other major cultural considerations include the handling of residue by tillage and planting equipment; the slower warm-up of cold and wet soils in the spring; fertilizer placement; pesticide effectiveness; crop response; and farming traditions. The minimal disturbance of the soils and the crop residue component of a conservation tillage system can impact pesticide and fertilizer programs.

The soils and the local climatic conditions affect conservation tillage programs. In areas that have a shorter growing season and colder temperatures, maintaining a cover of crop residue can slow spring warm-up of the soils and hinder the breakdown of the residue, particularly in areas of wetter and finer textured soils, such as Pit, Cupvar, and Henhill soils.

Regardless of the tillage program used, crop residue management is essential. A cover of crop residue helps to maintain soil tilth, the content of organic matter, and soil structure. A cover of crop residue also reduces the hazards of soil blowing and water erosion. Including high-residue crops, such as small grain, in the rotation can compensate for low-residue crops, such as strawberries. Also, incorporating grasses and green manure crops enhances the soil.

Removing excess water involves the management of surface and subsurface water in such a way that excessive accumulations resulting from rainfall, runoff, or irrigation are prevented. Removing excess water minimizes cropping limitations of water-sensitive crops, such as alfalfa hay, and can increase yields of other crops. Soils that can benefit from this practice are Graven, Pit, and Ravendale soils. Dudgen, Graven, Patburn, and Henhill soils have a seasonal high water table early in the season. Surplus water should be a consideration if water-sensitive crops are grown on these soils. Because the water table varies from year to year, surplus water is not always a concern. The high water table can severely affect the condition and productivity of a stand of alfalfa if the roots are in water during the growing season.

Controlling surface water can help to overcome limitations caused by accumulations of runoff in low-lying areas or by tailwater at the lower end of irrigated fields. Excess surface water affects crop performance and provides a habitat for weeds and mosquitoes. Land grading, tailwater recovery systems, and good irrigation water management can help to prevent problems resulting from excess surface water. These problems are mostly associated with the heavier textured soils that have a slow rate of water infiltration, such as Pastolla, Cupvar, and Pit soils. Diversions, dikes, or ditches are required in low-lying areas to divert and control floodwater and other surface water.

Reducing the content of toxic salts can significantly improve crop performance. Salts in the soil profile limit crop performance by competing for available water or by reducing the rate of water infiltration. Infiltration problems are caused by excessive sodium in the soil that disperses the soil aggregates and destroys soil structure. A reduced rate of water infiltration can hamper the efficiency of irrigation methods.

Nonsaline sodic conditions can be controlled or the affected soils reclaimed by applying soil amendments. Soil reclamation may be limited by the technical methods used to remove the salts. It can also be limited by financial resources or by water resources, or both. For reclamation, amendments are added that free the sodium so it can be leached below the root zone. Mechanical treatment is sometimes necessary to facilitate mixing of the amendments in the topsoil. Problems can arise when there is a high water table or when the leachate (water with the leached sodium) cannot be removed from the ground.

Erosion control is needed on most soils in the survey area. Soils on slopes of more than 2 percent are susceptible to water erosion. Coarse textured to medium textured soils are susceptible to soil blowing. Certain unique conditions can also affect erosion. Cold climatic conditions limit vegetative growth during critical erosive periods. Water erosion occurs when the raindrops strike bare soil and disperse the soil aggregates. When the soils are frozen and rainfall or a thaw occurs, runoff can erode the loose, unfrozen surface layer.

Soil blowing is a hazard if the soils are left bare. Among the most susceptible are soils that have a moderately coarse texture, such as Matquaw soils. Because of local climate and farming practices, the soils are usually bare and dry and being farmed during periods of strong winds. Erosion control requires planning and modification of cropping and cultural practices. The farming sequence should be designed so that crop residue is kept on the surface or a cover crop is growing during periods of high winds. Early fall seeding of cereal grains or ridge tillage can provide some protection from soil blowing. Permanent windbreaks are a sound, long-term investment and should be a consideration. Windbreaks not only reduce the hazard of erosion but also can prevent crop damage caused by blowing soil. Permanent windbreaks can consist of trees,

shrubs, or perennial grasses. Their maintenance can be incorporated into a conservation cropping plan.

The proper management of irrigation water is essential for all irrigated crops. Management of field irrigation grades, water delivery systems, and irrigation water is essential for profitable crop production, soil conservation, the efficient use of irrigation water, and the protection of ground water and surface water quality.

Irrigation methods that can be used are furrow, border, and sprinkler methods. For furrow and border irrigation, the fields should be graded for efficient irrigation water application. Slopes should be limited to less than 2 percent. Onsite investigation is needed before fields are graded. The depth of the soil to a pan or to other restrictive layers should be investigated so that the graded field can adequately support nutrients and water requirements. The length of irrigation runs should be designed according to soil infiltration characteristics so that irrigation water can be managed for moisture replenishment and salts management. Sprinkler irrigation systems are most suitable in areas of soils that have a very high rate of water infiltration or that have slopes of more than 2 percent. This soil survey can provide the information needed for decisions about irrigation management.

Pasture management should include strategies that protect the soil and that achieve sustained forage yields. Maintenance of desirable plant communities is a major consideration. Desirable plants are generally the most palatable. Weedy or undesirable plants thrive because they are generally not harvested by livestock. A system that restricts grazing to levels that allow continued vigorous growth is needed to maintain a pasture of desirable plants. A sufficient leaf surface must remain for plant regrowth. A good grazing plan leaves adequate leaf material and allows a rest period after grazing for plant recovery. Irrigation as needed to meet the water requirements of the plants is an important element of good pasture management. Also, a balanced fertilization program enhances production. For optimum pasture growth, soil moisture should be managed so that plant stress is minimized. Soil compaction can be prevented by excluding livestock immediately after irrigation. Harrowing or dragging to scatter manure enhances pasture production.

Proper hayland management results in sustained production and also protects the soils. Keeping the field clean of weeds and harvesting the forage at intervals that allow the plants to sustain efficient growth help to maintain the stands and result in profitable production. Good irrigation water management is essential. Overirrigation can deplete soil oxygen levels and leach nutrients below the root zone. Alfalfa plants cannot tolerate even short periods of water saturation. The plants may die, or they are attacked by disease and lose vigor. Excess water can increase the extent of undesirable grasses in the field.

Soils that have a high water table in the spring, such as Pit, Pastolla, and Henhill soils, are poorly suited to alfalfa hay. Stands can be severely damaged or destroyed during years when the water table is high for long periods. Fine textured soils that are subject to flooding or ponding, such as Pit soils, are also poorly suited to alfalfa hay. Stands can be severely damaged or destroyed during periods of prolonged saturation during the growing season.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation

Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, or for engineering purposes. Appendix B shows the criteria used to determine land capability classification.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit (USDA, 1961).

Capability classes, the broadest groups, are designated by numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 and IIIe-6. The numbers used to designate units within the subclasses are as follows:

0. Indicates limitations caused by stony, cobbly, or gravelly material in the substratum.
1. Indicates limitations caused by slope or by an actual or potential erosion hazard.
2. Indicates a limitation of wetness caused by poor drainage or by flooding.
3. Indicates a limitation caused by slow or very slow permeability in the subsoil or substratum or caused by a clayey subsoil or a substratum that is semiconsolidated.
4. Indicates a low available water capacity in sandy or gravelly soils.
5. Indicates limitations caused by a fine textured or very fine textured surface layer.
6. Indicates limitations caused by sodicity or salinity.
7. Indicates limitations caused by rocks, stones, or cobbles.
8. Indicates that the soil has a very low or low available water capacity because the root zone generally is less than 40 inches deep over massive bedrock.
9. Indicates limitations caused by very low or low fertility or by acidity or toxicity that cannot be corrected by adding normal amounts of fertilizer, lime, or other amendments.

The capability class and subclass of the soils in

this survey area are shown in table 6. The capability classification of each map unit also is given in the section “Detailed Soil Map Units.”

Major Land Resource Areas

The land capability classification system is further refined by designating the major land resource area (MLRA) of the soils. A major land resource area is a broad geographic area that has a distinct combination of climate, topography, vegetation, land use, and general type of farming (USDA, 1981). Parts of three of these nationally designated areas are in the survey area. These areas and their numbers are Klamath and Shasta Valleys and Basins, MLRA 21; Sierra Nevada Range, MLRA 22; and Siskiyou-Trinity Area, MLRA 5. The major land resource area number is given in the detailed soil map unit descriptions.

MLRA 21, Klamath and Shasta Valleys and Basins.—Less than half of the survey area, including much of the eastern part, is in MLRA 21. The area is characterized by lava plateaus interspersed with mountain valleys and lake basins. The Fall River and Big Valley areas are examples. The natural vegetation is mainly perennial grasses and shrubs with scattered juniper and conifers. Elevation mainly ranges from 3,300 to 5,500 feet. The average annual precipitation ranges from 12 to 20 inches, the average annual air temperature ranges from 45 to 54 degrees F, and the average frost-free season ranges from 50 to 130 days.

Most of the land on plateaus in the survey area is used for livestock grazing. The valleys are used for irrigated crops, mainly alfalfa hay and small grain.

MLRA 22, Sierra Nevada Range.—More than half of the survey area is in MLRA 22, including the higher elevations in the eastern part of the survey area and most of the western part. The area is characterized by the volcanic geology of the Modoc Plateau and Cascade ranges. The separation between the Cascades and the Modoc Plateau is indistinct, but it does follow the northeastern direction drawn by Burney Mountain and Mount Shasta. The vegetation is mainly coniferous forest. Elevation ranges from 3,000 to 7,500 feet. The average annual precipitation ranges from 25 to 60 inches, the average annual air temperature ranges from 38 to 48 degrees F, and the average frost-free season ranges from 60 to 100 days.

In the survey area, most of the land in this major land resource area is used for timber production. A few small areas are used for urban development or for livestock grazing.

MLRA 5, Siskiyou-Trinity Area.—Less than one-fourth of the survey area, including the western part, is in MLRA 5. The area is characterized by metamorphic rocks, but many of the soils have been influenced by volcanic material from the Cascade Range. Vegetation is mainly mixed conifers. Elevation ranges from 1,000 to 4,500 feet. The average annual precipitation ranges from 40 to 60 inches, the average annual air temperature ranges from 45 to 50 degrees F, and the average frost-free season ranges from 80 to 160 days.

In the survey area, most of the land in this major land resource area is used for timber production. A few small areas are used as wildlife habitat or for urban development.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation’s short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation’s prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forest land, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 5 percent. More detailed information about the criteria for prime farmland is provided in Appendix A, which precedes the tables at the back of this survey.

About 151,695 acres, or nearly 13 percent of the survey area, would meet the requirements for prime

farmland if an adequate and dependable supply of irrigation water were available.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 7. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading “Detailed Soil Map Units.”

Rangeland

Prepared by Richard J. King, range conservationist, and Dick R. McCleery, resource conservationist, Natural Resources Conservation Service

About 30 percent of the land in the survey area is rangeland. Cow-calf-stocker operations are the most common livestock enterprises.

Privately owned rangeland in the survey area is primarily in the Fall River and Big Valley areas and in numerous smaller, typically isolated valleys. These parcels represent homesteaded tracts and water sources within the public domain. Adjacent plateau and mountainous areas, about 20 percent of the survey area, are administered by the Forest Service and the Bureau of Land Management. The interdependence of private and public grazing lands is very important to most livestock operations. Many of the operating units have permits for spring, summer, or fall grazing on these Federal lands.

Cattle are either transported to milder climates for winter grazing or are fed hay on private lands during the winter. Calving normally begins in February and is completed by May. Calves are weaned in the fall and are either sold or kept until the following year. Yearlings are sold as stockers or shipped to feedlots, depending on their size.

Some cattle operations also include alfalfa hay enterprises. Hay is sold to supplement ranch income, and some is kept as winter feed. Some ranches have irrigated pasture and meadows. Flood irrigation is practiced to enhance native vegetation or improved pastures.

The history of range use in the survey area is very similar to the history of all western rangeland. Serious overgrazing had greatly changed the character of the native vegetation by the turn of the century. Substantial improvement has occurred following this degradation of soil, plant, wildlife, and water resources. Rangeland in the area is now generally considered to be in better ecologic condition than at any time during the past century.

Local areas still suffer from serious rangeland degradation in spite of the overall improvement in range condition. Much of the area is below its ecologic potential for livestock, wildlife, recreation, wood products, and clean water. Obvious symptoms of rangeland degradation are the lack of perennial grasses, the dominance of sagebrush or annual grasses, the invasion of junipers, and soil erosion.

Effective management of rangeland is dependent upon the management of all available human, financial, and land resources. This soil survey can help managers better understand the capabilities of their land resource. Such information is important in defining production and resource enhancement goals.

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Table 8 shows, for each soil that supports rangeland vegetation suitable for grazing, the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species. An explanation of the column headings in table 8 follows.

A *range site* is a distinctive kind of rangeland that produces a characteristic natural plant community that differs from natural plant communities on other range sites in kind, amount, and proportion of range plants. The relationship between soils and vegetation was ascertained during this survey; thus, range sites generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table are also important. Plant productivity, in turn, affects soil properties through the complex interrelationships of other organisms, fire, and climate.

Total production is the amount of vegetation that can be expected to grow annually on well managed

rangeland that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight is the total annual yield per acre of air-dry vegetation. Yields are adjusted to a common percent of air-dry moisture content. The relationship of green weight to air-dry weight varies according to such factors as exposure, amount of shade, recent rains, and unseasonable dry periods.

Characteristic vegetation—the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil—is listed by common name. Under *composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range condition. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. Range condition is an ecological rating only.

Controlling the period of time during which animals are in a pasture enables the rancher to optimize productivity and resource improvement. Planned grazing systems, fencing, water development, herding, and the use of livestock attractants are commonly used to control livestock. Livestock control minimizes overgrazing and maximizes the beneficial impacts of the animals. Controlling the frequency and severity of grazing helps to minimize plant stress. It can best be accomplished by controlling the time that animals have access to the plants. Allowing adequate rest periods following periods of grazing enhances plant vigor and productivity. Extreme periods of rest, or periods during which there is no impact from livestock, should be avoided. The beneficial impacts of animals include preventing perennial grass decadence through removal of old growth and increasing the amount of surface cover by creating a desirable seedbed and by planting seed through feeding and trampling.

Improving the vegetative cover can increase the rate of water infiltration and reduce the speed, amount, and peak volume of stormwater runoff. Concentrated runoff flows can scour drainageways and result in serious downcutting and widening of stream channels.

Historically, wildfires caused by lightning or by human activities served to keep the rangeland in the survey area relatively free of fire-sensitive sagebrush and juniper trees and thus promoted a vigorous stand of perennial grasses. Vigorous perennial grasses can provide a competitive barrier to woody, taprooted seedlings. Overgrazing, overrest, and fire prevention have reduced the vigor of perennial grasses in the survey area and encouraged the establishment of sagebrush and juniper.

Range seeding, brush management, and erosion-control practices can improve range conditions. Range that has deteriorated can be identified by brush encroachment and soil erosion. Proper grazing management, which prevents or corrects the causes of range deterioration, must be understood and applied before any mechanical range improvement practices are undertaken.

Diversity and stability of wildlife populations are important considerations in a range management plan. Wildlife can offer problems and opportunities to land managers. Understanding wildlife needs and tendencies and including them in management planning can minimize conflicts and optimize benefits. The benefits of managing for wildlife include increased income, reduced expenses, enhanced aesthetics, and improved recreational opportunities.

Wildlife and grazing concerns are addressed through the process of conservation planning. Conservation plans should include consideration of the organization of all land, financial, and human resources available. This process should be guided by clear production and landscape or resource enhancement goals. Production goals should define what the manager wants to produce, such as livestock, wildlife, recreational opportunities, aesthetics, clean water, or some combination of products. Landscape goals should define the range site characteristics needed to support the desired quantity and quality of production.

The local offices of the Natural Resources Conservation Service and the University of California Cooperative Extension Service can provide additional

information about the productivity and management concerns of these range sites as well as other conservation planning assistance.

Woodland Management and Productivity

Prepared by Jack Bramhall, area forester, Natural Resources Conservation Service

The benefits of forest land are numerous. Aesthetics and its effect on the recreation economy are important in the survey area. Forest land provides essential habitat for fish and wildlife. The forested watersheds provide clean water for wildlife and for agricultural, urban, and recreational uses in areas of the Pit and McCloud Rivers, which are part of the Shasta Lake system. Many residents depend on the forests for privacy and solitude for their homesites. The forest products industry is a primary employer for residents of the area. Products from the area's forests consist of softwood logs, lumber, and wood chips. Christmas trees and firewood are the major export commodities (State of California, 1980).

Forests have contributed to the economy of the survey area since around 1850. The original products were flume lumber for the mining industry, construction material for buildings, and firewood. Lumber mills are at Burney, McCloud, Nubieber, Bieber, and Adin. In addition, mills at Westwood, Redding, Mt. Shasta, Alturas, and Susanville take logs that are produced in the area. The survey area also has wood-burning electricity generating plants.

Mature timber stands support little diversity and low numbers of wildlife. Proper timber harvest improves the quality and diversity of woodland wildlife habitat by creating openings in the cover and by promoting earlier successional vegetation.

Cavity-nesting birds, such as chickadees, nuthatches, and owls, help to control woodland insects and rodents. Whenever possible, snags and trees containing nesting cavities should be left standing so that nesting sites are available for these important birds.

The following general information, along with information presented in the section "Detailed Soil Map Units," is intended only for use as a guide. The information may be useful to professional resource managers, landowners, planners, and visitors by enhancing their understanding of the characteristics and management of forest soils in the survey area. Onsite investigation by resource professionals results in site-specific data and solutions to specific resource problems.

Table 9 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity. The criteria used in developing ratings are described in Appendix E.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce in a pure stand under natural conditions. The number 1 indicates low potential productivity; 2 or 3, moderate; 4 or 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; *F*, a high content of rock fragments in the soil; *L*, low strength; and *N*, snowpack. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, F, L, and N.

For example, an ordination symbol of 8A indicates that potential productivity is 8 cubic meters per hectare per year and that there are no soil-related limitations, or the limitations are only slight.

The *potential productivity* of merchantable or commonly grown trees on a soil is expressed as a *site index* and as a *site range*. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Site indices for ponderosa pine and for Douglas-fir are based on 100-year base age curves (Meyer, 1938; McArdle, Meyer, and Bruce, 1949). Site indices for white fir and California red fir are based on 50-year base age curves (Schumacher, 1926).

Included in the map unit descriptions under the heading "Detailed Soil Map Units" are site indices based on the 50-year CACTOS site curve (Wensel and Beging, 1987). CACTOS is an abbreviation for California Conifer Timber Output Simulator. Site indices based on Dunning's 300-year curves are

also given in the map unit descriptions (Dunning, 1942).

Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. The first species listed for a soil is the indicator species for that soil. It generally is the most common species on the soil and is the one that determines the ordination class.

Adapted species that are suitable for planting are named in the map unit descriptions. Natural reseeding by conifers is sometimes adequate. In areas where mineral soil is exposed during years of favorable seed production, good regeneration can be expected on all but the very gravelly soils or shallow soils. Most of the hardwood species resprout after cutting. Resprouting is most vigorous if cutting is done between December and May (Murray and others, 1973).

In table 9, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment and season of use are not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Soil wetness caused by seasonal precipitation has an influence on the type of equipment and the time of its use. Surface compaction resulting from the use of wheeled or tracked equipment can be a concern on all soils during wet periods, except for coarse or very coarse gravelly soils. Unless they are covered with rocks or are in areas of very gravelly or coarse soils, roads are frequently impassable during the rainy season. Some soils are extremely dusty when dry. Watering, oiling, or applying other road surface and dust-control treatments may be desirable in areas of these soils during periods of heavy use.

The slope is an important consideration when harvesting systems or equipment is selected. Slope gradients of less than 30 percent present few limitations to wheeled and tracked equipment. On slopes of 30 to 50 percent, however, care is needed in selecting the equipment and in laying out the site. Cable yarding systems generally cause the least amount of soil disturbance, if the terrain and roads are conducive to their use. Where existing skid and haul roads can be used, however, or where short, steep slopes are intermixed with flat areas, tractor yarding equipment can sometimes be used with minimal soil disturbance. Low ground-pressure, torsion-suspension equipment can be used on the steeper slopes and generally results in less soil disturbance and compaction than conventional tractor equipment (Albright, 1980). In large areas that have slopes of more than 50 percent, cable yarding results in less soil disturbance than tractor yarding.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Soils that have an available water capacity of less than 2.5 inches in the upper 24 inches have severe limitations affecting seedling survival, especially on south- and west-facing slopes at elevations below 5,000 feet. Low available water capacity is less critical at the higher elevations, where the amount of water used by plants is generally lower.

Seedling survival can be seriously impacted by soils at the lower elevations having relatively warm mean annual temperatures. Soil temperatures at a depth of 20 inches are commonly several degrees higher in the open than in areas covered by a tree canopy. Surface temperatures may also be high

enough during the summer to result in heat injury to Douglas-fir seedlings on south-facing slopes. Species selection, type and size of planting stock, availability of shade, method of harvest, and the available water capacity of the soil should be considered when soils in these areas are reforested.

Plant competition ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the tree canopy. The main factors that affect plant competition are depth to the water table and the available water capacity. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent regeneration unless precautionary measures are applied.

Because productive soils have a high available water capacity, many plant species grow well. Thus, plant competition can be severe in areas of these soils. Perennial and annual grasses, forbs, varieties of manzanita, deerbrush, bitterbrush, and whitethorn ceanothus can dominate a site for several years after timber harvesting or after a fire. Conifer seedlings may regenerate slowly and can be suppressed by other vegetation because of competition for moisture and light. Careful selection of silvicultural and harvesting systems, intensive site preparation, and follow-up treatments may be needed to ensure adequate reforestation.

In table 9, ratings of the *hazard of soil damage from fire* are intended to be used as a general guideline when prescribed burns or revegetation after wildfires is planned. Fire can sometimes damage the soil. The risk of damage increases as the intensity of heat increases. The damage is mainly related to the loss of organic matter (Wells, 1978). Some soils have characteristics that enable them to withstand the effects of fire. These characteristics are used to rate the soils in terms of their susceptibility to damage from burning. A rating of *slight* indicates that most types of fire will not have an adverse effect on soil characteristics and future productivity. A rating of *moderate* indicates that some extra care is needed to maintain favorable soil characteristics. A rating of *severe* indicates that special precautions are needed to protect the content of organic matter and thus maintain the productivity of the soil.

Ratings of the *hazard of soil damage from compaction* indicate the tendency of a soil to be adversely affected by the weight of equipment or other traffic. Soil density is increased after compaction. This increase can affect productivity by increasing resistance to root penetration and reducing the availability of oxygen to plant roots. Compaction also reduces the rate of water infiltration. The ratings in the table are based on soil texture, content of organic matter, and content of rock fragments in the upper 10 inches (25 cm) of the soil. A rating of *slight* indicates that considerable effort would be required to compact the soil enough to adversely affect plant growth or the rate of water infiltration. A rating of *moderate* indicates that less effort is required to cause compaction or that an easily compacted soil recovers rapidly because of the type and amount of clay. A rating of *severe* indicates that the soils are easily compacted and that the degree of compaction can adversely affect plant growth or the rate of water infiltration. The recovery period is very slow, usually several years or more. Compaction is most likely to occur when the soil is wet. Forest management activities that can result in compaction include site preparation, log skidding, livestock grazing, and any other activity that applies weight on a wet soil (Adams and Froehlich, 1981).

Erosion rates on skid roads in harvested areas are commonly high. If the density of skid roads is high, total production can be reduced because of the effects of compaction on plant growth and the removal of surface soil horizons in disturbed areas. When used together, the ratings given for the hazard of soil damage from compaction and for the difficulty of revegetating exposed subsoil can help the user decide whether or not a reduction in future growth is likely.

Limitations for revegetating exposed subsoil with grasses and trees are rated as slight, moderate, and severe. Subsoil horizons can be exposed during forest management activities. Such exposure occurs on landings, road cuts and fills, and on some skid roads. Land managers may wish to revegetate these areas, or they may be required to do so by regulations. Revegetation can be for the purpose of erosion control or for timber production.

Characteristics of the subsoil that influence planting conditions, germination, and subsequent growth rates are considered in the ratings. These are general ratings only. Onsite investigation for individual projects is necessary. A rating of *slight* indicates that few problems affect revegetation. If locally adapted species are properly seeded, good survival and growth can be expected unless

compaction or other local unfavorable conditions exist. A rating of *moderate* indicates that additional care is needed when methods of erosion control or types of plants are selected. If trees are planted, some seedling mortality can be expected and growth rates are likely to be lower than in undisturbed areas. A rating of *severe* indicates that intensive and expensive measures are needed to establish plantings for erosion control. Some soils with a severe rating have little need for erosion-control plantings because the exposed areas are covered with large amounts of hard rock. Tree planting in these areas is very difficult, and survival and growth rates are much lower than in undisturbed areas. Onsite investigation is essential if revegetation is considered in areas of soils rated severe.

Conservation practices that can be used to prevent excessive soil loss and degradation of water quality vary by site. The location, design, and installation of roads, culverts, water bars, and stream crossings are important considerations. Seeding or mulching in areas of highly erodible soils helps to control sheet and rill erosion. Planting buffer strips along streams helps to prevent the sedimentation of the water, helps to control streambank erosion, and maintains a water temperature that is favorable to game fish. Filter strips constructed with slash along the base of fill slopes help to keep sediments from reaching the streams.

If brush is cleared or a site is prepared by tractors, windrowing may be considered as a reforestation technique. Removal of the upper part of the surface layer should be avoided. Soil nutrients are concentrated in the surface layer, and their removal can increase the rate of seedling mortality and reduce productivity. Constructing the windrows on the contour of steep slopes helps to prevent erosion caused by the concentration of surface runoff. The windrow piles should be extended entirely across the cleared slope so that surface runoff is captured, or the ends of the windrow piles should overlap the ends of piles downslope. Erosion can be controlled by reducing the downslope distance between the windrow piles.

Woodland Understory Vegetation

Understory vegetation consists of grasses, forbs, shrubs, and other plants. If well managed, some woodland can produce enough understory vegetation to support grazing of livestock or wildlife, or both, without damage to the trees.

The quantity and quality of understory vegetation vary with the kind of soil, the age and kind of trees in the canopy, the density of the canopy, and the depth and condition of the litter. The density of the canopy determines the amount of light that understory plants receive.

Increased understory production can be achieved by selective thinning and by reducing the density of the canopy. Understory plant species and management alternatives are given in the map unit descriptions under the heading “Detailed Soil Map Units.”

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition. Soil characteristics that greatly affect the growth of trees and shrubs include permeability, available water capacity, bedrock or indurated layers within a depth of 20 inches, and a high water table.

Grazing is detrimental to windbreaks and environmental plantings because the livestock compact the soil and remove the lower branches of trees and shrubs. Weeds and insects also affect the growth of trees and shrubs. Clean cultivation or the proper application of herbicides, or both, helps to control weeds. Fallowing a year prior to planting helps to provide a supply of moisture. Watering with drip irrigation or other methods of irrigation increases seedling survival rates and ensures continued growth.

Shallow soils and soils that have a water table within a depth of 20 inches have severe limitations affecting the establishment of windbreaks and environmental plantings. In some cases plantings can

be successfully established on these soils if proper species are selected and specialized management is applied.

Additional information on planting windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Natural Resources Conservation Service or the Cooperative Extension Service or from commercial nurseries.

Recreation

The soils of the survey area are rated in table 10 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 10, the degree of soil limitation is expressed as slight, moderate, or severe (see Appendix C). *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in table 10 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Wildlife Habitat

Prepared by Dave Patterson, biologist, Natural Resources Conservation Service

Soil characteristics alone rarely dictate the presence or absence of a particular wildlife species. However, the vegetative elements of wildlife habitat are strongly influenced by soil characteristics. For the purpose of illustrating the relationship between soils and habitats, the general soil map units in the survey area have been assigned to one of four habitat-soil groups. These groups are described in the following paragraphs. Each group consists of soils that occupy similar landscape positions, have similar properties, and produce or have the potential to produce one of twelve identifiable vegetative habitat elements and forms. The description of each group includes landscape position, soil properties, vegetative elements, habitats of special value, and management considerations. Additional information, such as range site descriptions and woodland grazing guides, is available in the local office of the Natural Resources Conservation Service.

Habitat-Soil Group 1—Wetlands and Related Habitats. This group includes about 86,000 acres and consists of general soil map units 1 and 2. The soils are mainly on flood plains and in basins, in meadows,

adjacent to streams and waterways, and on saline and alkali stream terraces. The soils are nearly level to strongly sloping, moderately coarse to fine textured, and very poorly drained to well drained. Vegetative elements include irrigated grain and seed crops, grasses and legumes, wild herbaceous plants, saline and nonsaline wetland plants, and riparian shrubs, vines, and trees. Habitats of special value include riparian shrubs and trees associated with waterways and wet meadows. Riparian vegetation is a very important kind of habitat for a diversity of fish and wildlife. The amount of available riparian habitat is limited, especially in the eastern half of the survey area. Basins ponded by runoff provide important temporary wetlands for waterfowl in early spring and produce forbs of importance to antelope and sage grouse in late spring and early summer. Wetlands created by levees and artificial flooding on both public and private lands provide important habitat for migratory waterfowl and other wildlife. Many wetlands are in the McArthur Swamp, Big Valley Swamp, and White Horse Reservoir areas. These areas attract large numbers of migratory waterfowl.

Important management considerations include manipulating ponded water so that a large and diverse supply of aquatic food plants and invertebrates is produced; opening water areas for waterfowl breeding and brood habitat; and planning livestock grazing systems that promote dense nesting cover, which attracts upland nesting waterfowl and pheasant. Livestock grazing management should also include consideration of the value of riparian trees, shrubs, and nesting cover for upland nesting birds, including waterfowl. Trees and shrubs should be retained near waterways. Drinking water should be provided for wildlife in the drier upland areas of this group.

Habitat-Soil Group 2—Rangeland and Related Habitats. This group includes about 270,000 acres and consists of general soil map unit 5 and parts of general soil map unit 3. The soils are mainly on lava plateaus, on hills, and in small areas on stream terraces covered with brush and grass. The soils are nearly level to steep, moderately coarse to fine textured, shallow to moderately deep, and moderately well drained or well drained. Vegetation is diverse and is strongly influenced by soil depth, soil texture, and slope aspect. Vegetative elements range from irrigated grain and seed crops and grasses and legumes in farmed areas to desertic shrubs and herbaceous plants in unfarmed areas on uplands. Low sage plant communities, especially when the stands are in good condition, provide high-quality herbs and browse for antelope, deer, sage grouse, and other species. The land area covered by these map units is large and includes a complex mixture of landforms and vegetation. Deer, antelope, and sage grouse use areas of this group seasonally as they seek out succulent and nutritious vegetation. Key habitats include deer fawning and antelope kidding areas; deer, antelope, and sage grouse wintering areas; and sage grouse strutting grounds, which are in the more sparsely vegetated areas. This group also includes many small riparian areas of importance to many wildlife species. Migration routes for deer and antelope are in many areas of the group.

Important management considerations include improved grazing systems, which can enhance the amount of ground cover and the vigor and productivity of plant communities. Burned and otherwise degraded bitterbrush sites require restoration through reseeding, planting, and improved grazing management. Retaining scattered pines and protecting riparian vegetation along waterways also conserve important wildlife habitat.

Habitat-Soil Group 3—Woodland and Associated Habitats. This group includes about 686,000 acres and consists of general soil map units 6, 7, 8, 9, 10, 11, and 12. The soils are mainly on lava plateaus, hills, and mountains covered with trees and brush. They are gently sloping to very steep, medium or moderately coarse textured, moderately deep to very deep, and well drained. Vegetation includes pine, cedar, and fir and mixed understories of ceanothus and manzanita. Vegetative elements include wild herbaceous plants, shrubs, desertic shrubs, riparian shrubs and trees, and coniferous trees. Isolated wetlands support nonsaline wetland plants. Deep canyons typically support significant stands of aspen, cottonwood, and other riparian vegetation. The land area covered by these map units is large and includes a complex mixture of landforms and vegetation. This group provides important summer habitat for deer and some winter habitat at the lower elevations. Trees and rock outcrops provide important perching, roosting, and nesting habitat for birds of prey, including goshawk, golden eagle, bald eagle, and numerous hawks and owls. Various mammals inhabit areas of this group, including mountain lion and black bear.

Important management considerations include timber harvest methods that minimize soil compaction and erosion and leave important raptor nesting trees. Carefully constructing, maintaining, or closing access roads helps to prevent erosion and siltation. Decisions about silvicultural practices should include consideration of the need for habitat diversity. The potential for erosion should be

considered when a timber harvest method is selected. Improved grazing systems can enhance the vegetative cover and the vigor and productivity of plant communities. Subdivision of key habitats should be discouraged through county zoning laws and conservation easements.

Habitat-Soil Group 4—Cropland, Pasture, and Associated Habitats. This group includes about 73,000 acres and consists of general soil map unit 4 and parts of general soil map unit 3. The soils are mainly on stream terraces. They are nearly level to strongly sloping, medium to fine textured, shallow to very deep, and moderately well drained or well drained. Vegetative elements include irrigated grain and seed crops, grasses and legumes, and wild herbaceous plants. Cropland areas create important habitat diversity, which benefits many wildlife species, such as California valley quail, pheasant, rabbits, songbirds, and birds of prey. Alfalfa fields provide important winter feeding areas for deer and antelope. Irrigated pasture and grain fields are used for grazing by waterfowl, especially geese.

Major management practices that promote wildlife in cropland areas include creating dense escape cover for protection from cold winter winds and predators, leaving shrubs and herbaceous plants in fence rows, leaving grain standing in fields during the winter, erecting raptor roosts on field borders, and planting shrubs and trees for food and cover. Drinking water is a necessity during late spring, summer, and fall.

The major elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that may be suitable for planting are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are mountainmahogany, bitterbrush, snowberry, and big sagebrush.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wild rice, saltgrass, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland include antelope, deer, sage grouse, meadowlark, and lark bunting.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the “Soil Properties” section. Appendix C gives the criteria used to determine soil limitations.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other

purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 12 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to

hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by

large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability

of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading “Soil Series and Their Morphology.”

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. “Loam,” for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, “gravelly.” Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 1993) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1986).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^{1}/_{3}$-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The

size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; *high*, more than 6 percent; and *very high*, greater than 9 percent.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.64. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. The soils assigned to group 1 are the most susceptible to soil blowing, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.

8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Tables 17 and 18 give estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

In table 17, *hydrologic soil groups* are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These

consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on observations of the water table at selected sites and on the evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. “More than 6.0” indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

In table 18, *depth to bedrock* is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

A *cemented pan* is a cemented or indurated subsurface layer within a depth of 5 feet. Such a pan causes difficulty in excavation. Pans are classified as thin or thick. A thin pan is less than 3 inches thick if continuously indurated or less than 18 inches thick if discontinuous or fractured. Excavations can be made by trenching machines, backhoes, or small rippers. A thick pan is more than 3 inches thick if continuously indurated or more than 18 inches thick if discontinuous or fractured. Such a pan is so thick or massive that blasting or special equipment is needed in excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the

most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (USDA, 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 19 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Andisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Xerand (*Xer*, meaning dry, plus *and*, from Andisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haploxerands (*Hapl*, meaning minimal horizonation, plus *xerand*, the suborder of the Andisols that has a xeric moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haploxerands.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is medial-skeletal, mixed, frigid Typic Haploxerands.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Seven soil orders are represented in the survey area. These are the Alfisols, Andisols, Entisols, Inceptisols, Mollisols, Ultisols, and Vertisols. The soils in these orders have an aquic, xeric, or aridic moisture regime and a mesic, frigid, or cryic temperature regime.

Alfisols have an argillic horizon. The surface horizon is too thin to qualify as a mollic epipedon. The Alfisols in the survey area are in the suborders Aqualfs and Xeralfs.

Aqualfs are Alfisols that have an aquic moisture regime or are artificially drained and that have characteristics associated with wetness. In this survey area, only the Gardens soils are in this suborder. These soils are classified in the subgroup Udollic Endoaqualfs. They have a light colored surface layer that is mottled.

Xeralfs are Alfisols that have a xeric moisture regime. In this moisture regime, winters are moist and cool and summers are warm and dry. The Xeralfs in the survey area are in the great groups Durixeralfs, Natrixeralfs, Haploxeralfs, and Palexeralfs.

Durixeralfs are Xeralfs that have a duripan within a depth of 40 inches. In this survey area, Dudgen soils are classified in the subgroup Typic Durixeralfs. These soils are on stream terraces in the Fall River Valley.

Natrixeralfs are Xeralfs that have a natric horizon.

Longbilly soils are classified in the subgroup Typic Natrixeralfs. These soils are on stream terraces, dominantly in the Big Valley. They show the effects of salt wicking on soil properties.

Haploxeralfs are Xeralfs that do not have a duripan or a natric horizon. They are represented in this survey area by the subgroups Andic Haploxeralfs, Vitrandic Haploxeralfs, and Ultic Haploxeralfs.

Andic Haploxeralfs have at least 7 inches of soil with volcanic properties within 30 inches of the soil surface. Properties include a bulk density of the fine-earth fraction of less than 1.0 and a ratio of acid-oxalate-extractable aluminum plus $^{1}/_{2}$ acid-oxalate-extractable iron of 1.0 percent or more. Gasper and Quaking soils on lava plateaus or hills and Gosch and Witcher soils on mountains are in this subgroup. These soils are good examples of the effects of recent volcanic activity on the surface of an older soil profile.

Vitrandic Haploxeralfs also have at least 7 inches of soil with volcanic properties within 30 inches of the soil surface. However, the properties are not as restrictive as those of the Andic subgroup. Vitrandic Haploxeralfs have at least one of the following properties: If the whole soil has more than 35 percent rock fragments, 60 percent of these fragments must be cinders or pumice; or the soil contains more than 30 percent volcanic glass in the fine-earth fraction; or the soil contains at least 5 percent volcanic glass and a ratio of acid-oxalate-extractable aluminum plus $^{1}/_{2}$ acid-oxalate-extractable iron of 0.40 percent or more. Kephart soils, which are on lava plateaus, are in this subgroup. The effects of recent volcanic activity are visible in these soils, but the material deposited on the surface is from the Medicine Lake Highlands and is much younger and coarser than the material deposited in areas of the Andic Haploxeralfs.

Ultic Haploxeralfs have a base saturation, by sum of cations, of less than 75 percent within 30 inches of the soil surface. The soils in this subgroup include Arkright and Burney soils on lava plateaus in the Burney area and Hambone and Boardburn soils on lava plateaus and hills, dominantly in the Big Valley Mountain area. These soils are typical of soils too distant from the most recent volcanic activity to have been influenced in the upper part of the pedon.

Palexeralfs are dominantly in areas of higher precipitation than the nearby Haploxeralfs. They are represented by the subgroups Andic Palexeralfs, Vitrandic Palexeralfs, and Mollic Palexeralfs.

Andic Palexeralfs have at least 7 inches of soil with volcanic properties within 30 inches of the soil surface. Properties include a bulk density of the fine-earth fraction of less than 1.0 and a ratio of acid-oxalate-extractable aluminum plus $^{1}/_{2}$ acid-oxalate-extractable iron of 1.0 percent or more. Wyntoon soils, which are on fan terraces, dominantly in the McCloud area, are in this subgroup.

Vitrandic Palexeralfs also have at least 7 inches of soil with volcanic properties within 30 inches of the soil surface. However, the properties are not as restrictive as those of the Andic subgroup. Vitrandic Palexeralfs must have at least one of the following properties: If the whole soil has more than 35 percent rock fragments, 60 percent of these fragments must be cinders or pumice; or the soil contains more than 30 percent volcanic glass in the fine-earth fraction; or the soil contains at least 5 percent volcanic glass and a ratio of acid-oxalate-extractable aluminum plus $^{1}/_{2}$ acid-oxalate-extractable iron of 0.40 percent or more. Jimmerson soils on lava plateaus and hills are in this subgroup.

Mollic Palexeralfs have at least 4 inches of dark soil that has more than 1 percent organic matter. Kilarc soils on mountains in the Montgomery Creek area are in this subgroup.

Andisols have andic soil properties throughout subhorizons, whether buried or not, that have a cumulative thickness of about 14 inches or more within about 24 inches of the mineral soil surface or the upper boundary of an organic layer that meets andic soil properties, whichever is shallower. Andisols in this area are classified in the Cryands and Xerands suborders.

Cryands are Andisols that have a cryic soil temperature regime. In this survey area, Canyoncreek and Hermit soils are in the subgroup Xeric Haplocryands. These soils are on mountains in the Cal Pines area.

Xerands are Andisols that have a xeric moisture regime. Xerands are divided into the great groups Melanoxerands, Vitrixerands, and Haploxerands.

Melanoxerands are Xerands that have a melanic epipedon. They are represented by two subgroups—Typic and Pachic. Pachic Melanoxerands have more than 6 percent organic matter and have mollic colors more than 20 inches thick. The other soils in this great group are classified as Typic Melanoxerands. Mounthat and Obie soils, which are on mountains in the McCloud and Hatchett Mountain Areas, are in these subgroups.

Vitrixerands are Xerands that have less than 15 percent water retention throughout a cumulative thickness of about 14 inches within 24 inches of the mineral soil surface. Vitrixerands are represented by the subgroups Alfic, Humic, and Typic.

Alfic Vitrixerands are Xerands that have an argillic

horizon within 50 inches of the mineral soil surface. Scarface soils on lava plateaus and hills, dominantly in the Loveness area, are in this subgroup.

Humic Vitrixerands have a mollic or umbric epipedon. Shasta soils on glacial outwash plains and fan terraces and Longbell soils on lava plateaus in the Medicine Lake Highlands are in this subgroup.

Typic Vitrixerands are typical for the great group and include the largest number of soils in the Vitrixerands great group. The soils in the survey area that are in this subgroup include Ponto soils on fan terraces and Neer soils in the McCloud area, dominantly on lava plateaus but also in a few areas on mountains. These soils were influenced by Mt. Shasta. Other soils include Danhunt soils on mountains, Twinbuttes soils on cindercones, and Dekkas soils on outwash plains, dominantly in the Burney Mountain area, and Rivalier soils, dominantly in the Big Valley Mountain area.

Haploxerands are other Xerands that do not have the characteristics described above. Haploxerands are represented in the subgroups Alfic Humic, Humic, Ultic, and Typic.

Alfic Humic Haploxerands have an argillic horizon within 50 inches of the mineral soil surface. Bundora soils on lava plateaus and hills, dominantly in the McCloud area, are in this subgroup. These soils could be an intergrade to the Andic Haploxeralfs subgroup.

Humic Haploxerands have a mollic or umbric epipedon. Revit soils on mountains, Chatterdown and Nikal soils on lava plateaus, and Shastina soils on glacial outwash plains and fan terraces in the McCloud area are in this subgroup. Mt. Shasta was the main source of parent material for these soils.

Ultic Haploxerands have a base saturation (by sum of cations) of less than 35 percent throughout the upper 20 inches. Zeugirdor and Goulder soils on lava plateaus or mountains are in this subgroup.

Typic Haploxerands are typical for the Haploxerands and include the largest number of soils in this great group. Soils in this subgroup that are dominantly in the Burney Mountain area include Carberry, Depner, and Wengler soils on lava plateaus and hills and Stacher soils on mountains. Soils that are dominantly in the Medicine Lake Highland area include Blankout, Medici, and Tionesta soils on hills.

Entisols have little or no evidence of development of pedogenic horizons. They do not have a B horizon and generally have less than 1 percent organic matter. Entisols in this area are classified in the Orthents and Psamments suborders.

Psamments are Entisols that have a texture of loamy fine sand or coarser in all subhorizons to a depth of 40 inches. Psamments in the survey area are in the subgroup Typic Xeropsamments and are represented by Coneward soils on lava plateaus and hills. This subgroup represents the typical concept of Xeropsamments that have a xeric moisture regime.

Orthents are Entisols that do not meet any of the requirements of the other suborders, such as an irregular decrease in organic matter content, a texture of loamy fine sand or coarser, or characteristics associated with wetness. Orthents in the survey area are in the great group Xerorthents, which are Orthents that have a xeric moisture regime. Xerorthents are represented by the subgroups Lithic and Vitrandic.

Lithic Xerorthents have a lithic contact within 20 inches of the soil surface. Etsel soils on shoulders and ridges of mountains in the McCloud area are in this subgroup.

Vitrandic Xerorthents have at least 7 inches of soil with volcanic properties within 30 inches of the soil surface and at least one of the following properties: If the whole soil has more than 35 percent rock fragments, 60 percent of these fragments must be cinders or pumice; or the soil has more than 30 percent volcanic glass in the fine-earth fraction; or the soil has at least 5 percent volcanic glass and a ratio of acid-oxalate-extractable aluminum plus $^1/_2$ acid-oxalate-extractable iron of 0.40 percent or more. Medlake soils on hills, dominantly in the Medicine Lake area, are in this subgroup.

Inceptisols are soils in which altered horizons have lost bases or iron and aluminum but have retained some weatherable minerals. These soils do not have an illuvial horizon enriched either with silicate clay that contains aluminum or with an amorphous mixture of aluminum and organic carbon. Inceptisols in this area have been classified in the suborders Aquepts, Ochrepts, and Umbrepts.

Aquepts are Inceptisols that have an aquic moisture regime or are artificially drained and have one or more of the following: A histic epipedon; or any horizon having characteristics associated with wetness directly below an ochric, umbric, or mollic epipedon. In this area, the subgroup Cumulic Humaquepts is represented by Odas soils in the McCloud area. These soils have an umbric epipedon that is more than 20 inches thick.

Ochrepts are Inceptisols that have an ochric epipedon or have an umbric or mollic epipedon that is less than 10 inches thick. The only great group represented in the area is Xerochrepts. Xerochrepts are Ochrepts that have a xeric moisture regime. Xerochrepts are represented by the subgroups Dystric, Lithic, Vitrandic, and Typic.

Dystric Xerochrepts have a base saturation of less

than 60 percent between depths of 10 to 30 inches. Kindig and Neuns soils on lava plateaus or mountains, dominantly in the McCloud area, are in this subgroup.

Lithic Xerochrepts have a lithic contact within 20 inches. Gassaway soils on lava plateaus and ridges, directly north and south of Fall River Valley, are in this subgroup.

Vitrandic Xerochrepts have at least one of the following properties: The whole soil has more than 35 percent rock fragments, and 60 percent of these fragments must be cinders or pumice, or the soil has more than 30 percent volcanic glass in the fine-earth fraction or at least 5 percent volcanic glass and a ratio of acid-oxalate-extractable aluminum plus $^1/_2$ acid-oxalate-extractable iron of 0.40 percent or more. Britton soils on knolls in the Burney area are classified in this subgroup.

Typic Xerochrepts are typical for the Xerochrepts great group. Stoner soils on stream terraces are in this subgroup.

Umbrepts are Inceptisols that have an umbric epipedon. They are represented in the survey area by the great group Xerumbrepts. Xerumbrepts are Umbrepts that have a xeric moisture regime. The subgroups represented in the survey area are Lithic and Typic.

Lithic Xerumbrepts have a lithic contact within 20 inches of the mineral soil surface. Jahjo soils on lava plateaus, dominantly south of the Medicine Lake Highlands area, are in this subgroup.

Typic Xerumbrepts represent the typical concept of Xerumbrepts. Nanny soils on alluvial terraces are in this subgroup.

Mollisols have a mollic epipedon and have a base saturation by ammonium acetate of greater than 50 percent. Mollisols in this area are classified in the suborders Aquolls and Xerolls.

Aquolls are Mollisols that either have an aquic moisture regime or are artificially drained and have at least one characteristic associated with wetness, such as a histic epipedon or mottles near the soil surface. In this survey area the great groups are Argiaquolls, Duraquolls, Epiaquolls, and Endoaquolls.

Argiaquolls are Aquolls that have an argillic horizon. The subgroup Typic Argiaquolls is the only one recognized in the survey area. Nosoni soils on stream terraces and basin edges, in many areas throughout the survey area, are in this subgroup.

Duraquolls are Aquolls that have a duripan within a depth of 40 inches. The Duraquolls in this survey area are in the subgroups Argic and Natric.

Argic Duraquolls have an argillic horizon. Burman soils on fan terraces and basin edges are in this subgroup. Natric Duraquolls have a natric horizon. Whipp soils in basins, in the Fall River Valley and Big Valley, are in this subgroup.

Cumulic Vertic Epiaquolls have a mollic epipedon 24 inches or more thick, a high coefficient of linear extensibility, and cracking from the surface to a depth of 20 inches. Swanberger soils in basins throughout the area are classified in this subgroup.

Endoaquolls are Aquolls that do not have the characteristics described for the other great groups. Two subgroups are recognized in the survey area. They are Cumulic and Aquandic. Cumulic Endoaquolls have a mollic epipedon more than 20 inches thick with an irregular decrease in organic matter content. Keddie soils on flood plains and in basins in the Burney and Hat Creek areas and Pastolla soils in basins in the Fall River Valley and Big Valley are in this subgroup. Esro soils, at the higher elevations in the Cal Pines area, are in the Aquandic Endoaquolls subgroup.

Xerolls are Mollisols that have a xeric moisture regime or an aridic moisture regime bordering on xeric but do not have a cryic temperature regime. Most of the soils in the Xerolls suborder are in areas with precipitation of less than 30 inches. The great groups in this survey area are Argixerolls, Durixerolls, Palexerolls, and Haploxerolls.

Argixerolls are Xerolls that have an argillic horizon. Nine subgroups are recognized—Andic, Aquultic, Aridic, Lithic, Lithic Ultic, Pachic, Ultic, Vitrandic, and Typic.

Andic Argixerolls have, throughout one or more horizons having a total thickness of 7 inches or more within 30 inches of the mineral soil surface, a fine-earth fraction with a bulk density of 1.0 or less and aluminum plus $^1/_2$ iron percentages totaling more than 1.0. Fleener soils on lava plateaus and hills are in this subgroup.

Aquultic Argixerolls have characteristics associated with wetness. Also, they have a base saturation by sum of cations of less than 75 percent within 30 inches of the soil surface. Winnibulli soils on fan terraces are in this subgroup.

Aridic Argixerolls have an aridic moisture regime and occur in areas where precipitation is usually less than 16 inches. Badenaugh soils on stream terraces and Searvar soils on lava plateaus and hills in areas dominantly south and east of Big Valley are in this subgroup.

Lithic Argixerolls have a lithic contact within 20 inches of the soil surface. Adinot, Deven, Longcreek, Malinda, and Orhood soils, which are dominantly on

lava plateaus or hills mainly in areas around Big Valley, are in this subgroup.

Lithic Ultic Argixerolls have a lithic contact within a depth of 20 inches. Also, they have a base saturation by sum of cations of less than 75 percent in some part of the horizon above the contact. Bollibokka soils on lava plateaus and hills, in areas dominantly southeast of Fall River Valley, are in this subgroup. The soils in this subgroup have a lower base saturation than the Lithic Argixerolls because they are in areas where precipitation is more than 16 inches.

Pachic Argixerolls have a mollic epipedon more than 20 inches thick. Soils in the survey area that are in this subgroup include Dotta, Esperanza, Henhill, Jadpor, and Patburn soils on stream terraces throughout the valleys; Lonkey soils on lava plateaus and hills; and Erig and Ricketts soils on hills.

Ultic Argixerolls have a base saturation by sum of cations of less than 75 percent in some part within 30 inches of the soil surface. Precipitation ranges mainly from 16 to about 30 inches. Most of the soils in this subgroup are in areas of transition from sagebrush to conifers. The soils in this subgroup include Chirpchatter, Gooval, Hunsinger, Jellico, Splawn, and Trojan soils on lava plateaus or hills.

Vitrandic Argixerolls have at least 7 inches of soil material with volcanic properties within 30 inches of the soil surface. Also, they have at least one of the following properties: If the whole soil has more than 35 percent rock fragments, 60 percent of these fragments must be cinders or pumice; the soil contains more than 30 percent volcanic glass in the fine-earth fraction; or the soil contains at least 5 percent volcanic glass and has a ratio of acid-oxalate-extractable aluminum plus $^1/_2$ acid-oxalate-extractable iron of 0.40 percent or more. Soils in this subgroup are Roundbarn and Said soils, dominantly in the Big Valley Mountains; Datom soils on knolls; and Bunselmeier soils on older cindercones throughout the area.

Typic Argixerolls represent the typical concept of Argixerolls. Soils in this subgroup are Daphnedale and Pittville soils on stream terraces, Fiddler soils on hills, and Whitinger soils on mountains.

Durixerolls are Xerolls that have a duripan within a depth of 40 inches. Precipitation in most areas of Durixerolls is less than 16 inches, and the dominant vegetation is sagebrush. Three subgroups are recognized—Abruptic Argiduridic, Argiduridic, and Typic.

Abruptic Argiduridic Durixerolls have an abrupt clay increase between the surface epipedon and the argillic horizon. In addition, they have an aridic moisture regime. Soils in this subgroup are Jellycamp and Vansickle soils on lava plateaus.

Argiduridic Durixerolls have an aridic moisture regime. Soils in this subgroup are Bieber, Modoc, and Oxendine soils on stream terraces, dominantly in the Big Valley area, and Ollierivas soils on lava plateaus.

Typic Durixerolls represent the typical concept of Durixerolls. Soils in this subgroup are Graven soils on stream terraces in the Fall River Valley area and Sweagert soils on stream terraces in the Big Valley area. Precipitation in areas of these soils is about 16 inches, and the soils maintain enough moisture for a long enough period to have a xeric moisture regime instead of an aridic moisture regime.

Palexerolls are Xerolls that do not have a clay decrease with increasing depth of 20 percent or more from the maximum clay content within 60 inches of the mineral soil surface and have hue of 7.5YR or redder and chroma of 5 or more in the matrix. The only subgroup in the survey area is Ultic Palexerolls.

Ultic Palexerolls have a base saturation of 75 percent or less in one or more subhorizons within the argillic horizon. Loveness soils on lava plateaus and hills are in this subgroup.

Haploxerolls are the Xerolls that do not meet any of the properties of the other Xerolls listed in the key. Five subgroups are represented in the survey area. These are Aquic, Aquultic, Lithic, Pachic, and Pachic Ultic.

Aquic Haploxerolls have characteristics associated with wetness. Lunsford soils on stream terraces are examples of Aquic Haploxerolls in the survey area.

Aquultic Haploxerolls have characteristics associated with wetness. Also, they have a base saturation by sum of cations of less than 75 percent within a depth of 30 inches. Jacksback soils on stream terraces, dominantly in the Burney Mountain area, are in this subgroup.

Lithic Haploxerolls have a lithic contact within a depth of 20 inches. The Stukel soils on hills are in this subgroup.

Pachic Haploxerolls are the Haploxerolls that have a mollic epipedon more than 20 inches thick. Chalkford soils on stream terraces, dominantly in the Big Valley area, and Murken soils on lava plateau escarpments are in this subgroup.

Pachic Ultic Haploxerolls have a mollic epipedon more than 20 inches thick. Also, they have a base saturation by sum of cations in some part within 30 inches of the soil surface. Matquaw soils, which are on stream terraces, are in this subgroup.

Ultisols have an argillic horizon and have a base saturation of less than 35 percent to a depth at least

50 inches from the soil surface. Ultisols in this survey area are in the suborder Humults. Humults have about 1.5 percent organic matter in the upper 6 inches of the argillic horizon. Xeric Palehumults are the only subgroup recognized in the area.

Xeric Palehumults have a thick argillic horizon (more than 60 inches thick) and do not have a clay decrease of less than 20 percent. They are in a xeric moisture regime. Kettlebelly soils on mountains, dominantly in the Montgomery Creek area and south of McCloud, are in this subgroup. These soils formed in slope alluvium from metamorphic rock of the Montgomery Creek Formation, some of the oldest parent material in the area.

Vertisols are fine textured throughout and consist in part of clays that shrink and swell significantly upon wetting and drying. Vertisols in this area have been placed in the Aquerts and Xererts suborders.

Aquerts are soils that have characteristics associated with wetness. Two great groups are recognized in the survey area—Epiaquerts and Endoaquerts.

Epiaquerts have saturation in one or more layers within 79 inches of the soil surface. Two subgroups are recognized—Xeric and Typic. Dosa soils on stream terraces are in the Xeric subgroup, and Pitvar soils on basins and in drainageways are in the Typic subgroup.

Endoaquerts are the Aquerts that do not meet any of the properties of the other Aquerts listed in the key. The only subgroup recognized in the survey area is Xeric Endoaquerts. Pit soils on flood plains and in basins, dominantly in the Fall River Valley and Big Valley areas, are in this subgroup.

Xererts are soils that, unless irrigated, have cracks that open and close 60 consecutive days or more in the 90 days following the summer solstice in most years. Two great groups are recognized—Durixererts and Haploxererts.

Durixererts have a duripan within 40 inches of the soil surface. Three subgroups are recognized in the survey area—Aquic, Chromic, and Haplic.

Aquic Durixererts have distinct or prominent mottles within 20 inches of the mineral soil surface. Lasvar soils in basins and drainageways are in this subgroup. These soils are dominantly in areas with higher precipitation, intermingled with the forested areas.

Chromic Durixererts have chroma of 3 or more. Cuppy soils on lava plateaus are in this subgroup. Precipitation and vegetation are similar to those in areas of the Cupvar soils.

Haplic Durixererts have a duripan that is not indurated. Cupvar soils in basins are in this subgroup. These soils are dominantly in areas with lower precipitation, intermingled with the sagebrush areas.

Haploxererts are all other soils not recognized in other subgroups. Two subgroups are recognized in the survey area—Chromic and Leptic.

Chromic Haploxererts have moist values of 4 or more and dry values of 6 or more, and chromas dry or moist are 3 or more. Ravendale soils in basins are in this subgroup.

Leptic Haploxererts have a lithic contact within 40 inches of the soil surface. Lassen and Karcal soils on lava plateaus are in this subgroup. These soils are dominantly in areas surrounding the Big Valley.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the “Soil Survey Manual” (USDA, 1993). Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” (USDA, 1999) and in “Keys to Soil Taxonomy” (USDA, 1996). Unless otherwise indicated, matrix colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section “Detailed Soil Map Units.”

Adinot Series

The Adinot series consists of shallow, moderately well drained soils that formed in slope alluvium weathered from extrusive igneous rock. These soils are on pediments and hills. Slopes range from 2 to 30 percent. The mean annual precipitation is 12 to 16 inches, and the mean annual temperature is about 48 to 50 degrees F.

Taxonomic classification: Loamy, mixed, superactive, mesic Lithic Argixerolls

Typical Pedon

Adinot very gravelly sandy loam, in an area of Adinot-Adinot, eroded, complex, 2 to 15 percent slopes, about 5 miles southeast of Adin; 1,300 feet west and 100 feet south of the northeast corner of sec. 22, T. 38 N., R. 9 E.; Adin SW (Letterbox Hill) quadrangle (7.5 minute series):

A—0 to 2 inches; grayish brown (10YR 5/2) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate thin platy structure; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; many very fine tubular pores; 40 percent gravel; neutral (pH 7.0); abrupt smooth boundary.

Bt1—2 to 5 inches; brown (10YR 5/3) gravelly loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and common fine roots; many very fine tubular pores; common moderately thick clay films in pores and common thin clay films on faces of peds; 20 percent gravel; neutral (pH 7.0); clear smooth boundary.

Bt2—5 to 11 inches; brown (10YR 5/3) gravelly clay loam, dark brown (10YR 3/3) moist; strong medium subangular blocky structure; hard, friable, slightly sticky and plastic; many fine roots; common very fine tubular pores; common moderately thick clay films in pores and on faces of peds; 20 percent gravel; neutral (pH 7.0); abrupt smooth boundary.

Bt3—11 to 14 inches; brown (10YR 5/3) very gravelly clay loam, dark brown (10YR 3/3) moist; strong medium subangular blocky structure; hard, firm, sticky and plastic; common fine roots; few very fine tubular pores; common moderately thick clay films in pores and on faces of peds; 45 percent gravel; neutral (pH 7.0); abrupt smooth boundary.

2R—14 inches; hard tuff.

The depth to lithic contact ranges from 14 to 20 inches. The particle-size control section averages 30 to 35 percent clay and 5 to 30 percent rock fragments, mostly gravel. Base saturation by sum of cations ranges from 95 to 100 percent throughout. The content of rock fragments on the surface, mostly gravel, ranges from 35 to 50 percent.

The A horizon has dry color of 10YR 4/3, 5/2, or 5/3. Moist color is 10YR 3/2 or 3/3. The texture is very gravelly sandy loam, very cobbly sandy loam, or very stony sandy loam. The content of rock fragments, mostly gravel or cobbles, ranges from 35 to 60 percent. The content of organic matter is 1 to 2 percent.

The Bt1 horizon has dry color of 10YR 4/3, 5/2, or 5/3. Moist color is 10YR 3/2 or 3/3. The content of organic matter is 1 to 2 percent. The texture is gravelly loam or loam with a clay content of 25 to 27 percent. The content of rock fragments, mostly gravel, ranges from 5 to 30 percent.

The Bt2 horizon has dry color of 10YR 4/3, 5/2, or 5/3. Moist color is 10YR 3/2 or 3/3. The content of organic matter is 1 to 2 percent. The texture is gravelly clay loam or clay loam with a clay content of 27 to 35 percent. The content of rock fragments, mostly gravel, ranges from 5 to 30 percent.

The Bt3 horizon has dry color of 10YR 4/3, 5/2, or 5/3. Moist color is 10YR 3/2 or 3/3 or 7.5YR 3/2. The texture is clay loam or very gravelly clay loam with a clay content of 35 to 40 percent. The content of rock fragments, mostly gravel, ranges from 5 to 50 percent.

The eroded Adinot soil in map unit 105 is outside the range for the series. The depth to bedrock is 8 to 14 inches, and the particle-size control section ranges from 20 to 27 percent clay. These differences, however, do not significantly affect use and management.

Argixerolls

Argixerolls consist of shallow or moderately deep, well drained soils that formed in colluvium from extrusive igneous rock. These soils are on lava plateau escarpments. Slopes range from 30 to 75 percent. The mean annual precipitation is 12 to 20 inches, and the mean annual temperature is 48 to 52 degrees F.

Taxonomic classification: Argixerolls

Representative Pedon

Argixerolls, in an area of Rubble land-Argixerolls-Rock outcrop complex, 30 to 75 percent slopes, about 2 miles northwest of Little Valley; 1,500 feet north and 2,000 feet west of the southeast corner of sec. 30, T. 36 N., R. 7 E.; Little Valley NW (Little Valley) quadrangle (7.5 minute series):

A—0 to 7 inches; dark grayish brown (10YR 4/2) very stony loam, dark brown (7.5YR 3/2) moist; weak thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; few very fine vesicular pores; 10 percent gravel and 20 percent stones; slightly acid (pH 6.5); clear wavy boundary.

Bt1—7 to 15 inches; dark grayish brown (10YR 4/2) bouldery sandy clay loam, dark brown (7.5YR 3/2) moist; moderate very fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine, fine, and medium and few coarse roots; few very fine, fine, and medium tubular pores; common thin clay films in bridges between mineral grains and in pores and few thin clay films on faces of peds; 10 percent gravel, 5 percent cobbles, 35 percent stones, 5 percent boulders; neutral (pH 7.0); gradual wavy boundary.

Bt2—15 to 25 inches; dark grayish brown (10YR 4/2) extremely stony sandy clay loam, dark brown (7.5YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, sticky and slightly plastic; many very fine and common fine roots; common very fine and fine tubular and interstitial pores; common thin clay films in bridges of mineral grains and in pores and thin clay films on faces of peds; 5 percent gravel, 5 percent cobbles, 70 percent stones; neutral (pH 7.0); clear irregular boundary.

R—25 inches; fractured basalt with cracks 6 to 10 inches apart; cracks are 1/2 inch to 2 inches wide; little soil material is in the cracks.

The depth to lithic contact ranges from 10 to 40 inches. The particle-size control section averages 18 to 35 percent clay and 35 to 80 percent rock fragments, mostly stones and boulders. The content of rock fragments on the surface, mostly stones or cobbles, ranges from 35 to 60 percent.

Arkright Series

The Arkright series consists of moderately deep, well drained soils that formed in slope alluvium derived from basalt. These soils are on lava plateaus. Slopes range from 2 to 9 percent. The mean annual precipitation is about 16 to 25 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Fine-loamy, parasesquic, mesic Ultic Haploxeralfs

Typical Pedon

Arkright gravelly loam, in an area of Burney-Arkright complex, 2 to 9 percent slopes, about 1 mile east of Cassel; 2,500 feet south and 1,300 feet west of the northeast corner of sec. 4, T. 35 N., R. 3 E.; Burney NE (Cassel) quadrangle (7.5 minute series):

Oi—1 inch to 0; pine needles in various stages of decomposition.

A1—0 to 3 inches; brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 3/2) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine interstitial pores; 15 percent gravel; slightly acid (pH 6.5); clear smooth boundary.

A2—3 to 10 inches; brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 3/4) moist; moderate very fine and fine granular structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine interstitial pores; 15 percent gravel and 5 percent cobbles; slightly acid (pH 6.5); clear smooth boundary.

Bt1—10 to 14 inches; reddish brown (5YR 4/4) gravelly loam, dark reddish brown (5YR 3/4) moist; moderate medium angular blocky structure; hard, very friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common very fine tubular pores; common thin clay films on peds and in pores; 15 percent gravel and 5 percent cobbles; slightly acid (pH 6.5); gradual smooth boundary.

Bt2—14 to 24 inches; reddish brown (5YR 4/4) cobbly clay loam, dark reddish brown (5YR 3/4) moist; moderate medium angular blocky structure; hard, very friable, sticky and plastic; few very fine, fine, and medium roots; common very fine tubular pores; common moderately thick clay films on peds and in pores; 10 percent gravel and 20 percent cobbles; slightly acid (pH 6.5); abrupt wavy boundary.

Cr—24 inches; weathered, fractured vesicular basalt.

The depth to the paralithic contact ranges from 20 to 40 inches. The particle-size control section (10 to 24 inches) ranges from 25 to 35 percent clay and 5 to 35 percent rock fragments, mostly gravel. The content of rock fragments on the surface, mostly gravel, ranges from 5 to 30 percent. The percent iron oxide to percent clay ratio ranges from 0.21 to 0.26. NaF pH is 8.5 to 9.0 and decreases with depth.

The A horizon has dry color of 7.5YR, 4/4, 5/4, or 5/2. The content of clay ranges from 18 to 25 percent. The content of rock fragments, mostly gravel or cobbles, ranges from 15 to 25 percent. Reaction is moderately acid or slightly acid. Base saturation by sum of cations ranges from 50 to 75 percent. The content of organic matter ranges from 2 to 6 percent. Iron oxide ranges from 4.5 to 7.5 percent.

The Bt horizon has dry color of 5YR 4/4, 5/4, or 5/6. Moist color is 2.5YR 3/4 or 5YR 3/4. The texture is gravelly loam, cobbly loam, gravelly clay loam, or cobbly clay loam. The content of clay ranges from 25 to 35 percent. The content of rock fragments, mostly gravel or cobbles, ranges from 15 to 35 percent. Reaction is slightly acid or neutral. Base saturation by sum of cations ranges from 35 to 75 percent. Iron oxide ranges from 5.0 to 8.5 percent.

Badenaugh Series

The Badenaugh series consists of very deep, well drained soils that formed in alluvium derived from mixed sources. These soils are on fans and terraces. Slopes range from 2 to 15 percent. The mean annual

precipitation is about 12 to 18 inches, and the mean annual temperature is about 46 to 49 degrees F.

Taxonomic classification: Loamy-skeletal, mixed, superactive, mesic Aridic Argixerolls

Typical Pedon

Badenaugh very gravelly sandy loam, in an area of Badenaugh-Matquaw association, 2 to 15 percent slopes, about 7 miles east of Little Valley, 300 feet south of an unnamed creek; 550 feet east of the northwest corner of sec. 7, T. 35 N., R. 9 E.; Little Valley NW (Little Valley) quadrangle (7.5 minute series):

A—0 to 3 inches; brown (10YR 5/3) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots; common very fine interstitial pores; 25 percent gravel and 15 percent cobbles; neutral (pH 7.0); clear smooth boundary.

Bw—3 to 14 inches; brown (10YR 4/3) very cobbly sandy clay loam, dark brown (7.5YR 3/2) moist; moderate thin and medium platy structure parting to moderate fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine and common medium and coarse roots; common very fine and fine tubular pores; few thin clay films in bridges between mineral grains; 15 percent gravel and 35 percent cobbles; neutral (pH 7.0); gradual wavy boundary.

Bt1—14 to 23 inches; dark yellowish brown (10YR 4/4) very cobbly sandy clay loam, dark brown (7.5YR 3/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable, sticky and slightly plastic; many fine, medium, and coarse roots; many very fine, fine, and medium tubular pores; common thin clay films on peds and many thin clay films in pores; 20 percent gravel and 30 percent cobbles; neutral (pH 7.0); clear smooth boundary.

Bt2—23 to 45 inches; brown (7.5YR 4/4) very cobbly sandy clay loam, dark brown (7.5YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; few fine and medium roots; common fine and medium tubular pores; many thin clay films on peds and in pores; 30 percent gravel and 30 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

C—45 to 60 inches; strong brown (7.5YR 5/6) very cobbly sandy loam, dark brown (7.5YR 4/4) moist; single grain; loose, nonsticky and nonplastic; few medium roots; common very fine irregular pores; 45 percent cobbles and 10 percent gravel; slightly acid (pH 6.5).

The thickness of the solum ranges from 30 to 50 inches.

The A horizon has dry color of 10YR 5/3 or 5/2. Moist color is 10YR 3/2 or 3/3. The content of organic matter ranges from 1 to 3 percent. The content of clay ranges from 10 to 20 percent. The content of rock fragments, mostly gravel and cobbles, ranges from 35 to 50 percent. Reaction is slightly acid or neutral. Base saturation by ammonium acetate ranges from 80 to 90 percent.

The Bt horizon has dry color of 10YR 4/4 or 7.5YR 4/4. Moist color is 7.5YR 3/2 or 3/4. The content of organic matter is less than 1 percent. The content of clay ranges from 25 to 35 percent. The content of rock fragments, mostly gravel and cobbles, ranges from 50 to 70 percent. Reaction is slightly acid or neutral. Base saturation by ammonium acetate ranges from 75 to 85 percent.

The C horizon has dry color of 7.5YR 5/6 or 6/4. Moist color is 7.5YR 4/4 or 10YR 4/4. The content of clay ranges from 10 to 20 percent. The content of rock fragments ranges from 55 to 80 percent, mostly gravel and cobbles. Reaction is slightly acid or moderately acid. Base saturation by ammonium acetate ranges from 75 to 80 percent.

Bieber Series

The Bieber series consists of shallow, moderately well drained soils that formed in alluvium derived from extrusive igneous rock and lake sediments. These soils are on stream terraces. Slopes range from 0 to 15 percent. The mean annual precipitation is 10 to 16 inches, and the mean annual temperature is 48 to 50 degrees F.

Taxonomic classification: Clayey, smectitic, mesic, shallow Argiduric Durixerolls

Typical Pedon

Bieber gravelly sandy loam, in an area of Bieber-Modoc complex, 0 to 5 percent slopes, about 0.75 mile north of Nubieber, 200 feet east of road; 150 feet east and 1,400 feet north of the southwest corner of sec. 14, T. 38 N., R. 7 E.; Bieber NW (Lookout) quadrangle (7.5 minute series):

A—0 to 3 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate thin platy structure; slightly hard, friable, nonsticky and nonplastic; many very fine roots; many very fine tubular pores; 20 percent gravel; neutral (pH 7.0); clear smooth boundary.

BAt—3 to 5 inches; yellowish brown (10YR 5/4) gravelly sandy loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure;

hard, friable, slightly sticky and slightly plastic; many very fine roots; common very fine tubular pores; few thin clay films in pores; 20 percent gravel; neutral (pH 7.0); clear smooth boundary.

Bt1—5 to 11 inches; yellowish brown (10YR 5/4) clay loam, dark brown (10YR 3/3) moist; strong medium angular blocky structure; very hard, firm, sticky and plastic; common very fine roots; common very fine tubular pores; many clay films on peds and common moderately thick clay films in pores; 10 percent gravel; neutral (pH 7.0); abrupt smooth boundary.

Bt2—11 to 17 inches; light yellowish brown (10YR 6/4) clay, dark yellowish brown (10YR 4/4) moist; strong medium prismatic structure parting to strong fine angular blocky; very hard, firm, sticky and plastic; few very fine roots; many moderately thick clay films in pores and on peds; 10 percent gravel; neutral (pH 7.0); abrupt smooth boundary.

Bt3—17 to 19 inches; light yellowish brown (10YR 6/4) clay, dark yellowish brown (10YR 4/4) moist; strong fine angular blocky structure; very hard, firm, sticky and plastic; few very fine roots; few very fine tubular pores; many moderately thick clay films in pores and on peds; 10 percent gravel consisting of pan material; neutral (pH 7.0); abrupt smooth boundary.

2Bkqm1—19 to 24 inches; duripan with $^{1}/_{2}$- to $^{3}/_{4}$-inch continuous opal and calcium carbonate cap; strong thin platy structure; extremely hard, brittle; strongly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.

2Bkqm2—24 to 31 inches; duripan; massive; very hard, brittle; moderately alkaline (pH 8.0) strongly effervescent; clear smooth boundary.

2Bkq—31 to 60 inches; light yellowish brown (10YR 6/4), strongly cemented very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; massive; very hard, firm, nonsticky and nonplastic; moderately alkaline (pH 8.0).

Depth to the duripan ranges from 10 to 20 inches.

The A and BA horizons have dry color of 10YR 5/2, 5/3, or 5/4. Moist color is 10YR 3/2 or 3/3. These horizons are sandy loam or loam or the gravelly analogs of these textures. The content of clay ranges from 15 to 25 percent. The content of rock fragments, mostly gravel, ranges from 0 to 30 percent.

The upper part of the Bt horizon has color, consistency, and texture similar to those of the A horizon. The lower part of the Bt horizon has dry color of 10YR 5/2, 5/4, or 6/4 or 7.5YR 4/2. Moist color is 10YR 3/2, 3/3, 3/4, or 4/4 or 7.5YR 3/2 or 4/4. Value of 5 or less (3 or less moist) and chroma of 3 or less (moist) occur in the upper part of the Bt horizon. This horizon is clay loam or clay. The content of clay ranges from 35 to 45 percent. The content of rock fragments, mostly gravel, ranges from 5 to 20 percent.

Blankout Series

The Blankout series consists of very deep, well drained soils that formed in tephra. These soils are on hills. Slopes range from 2 to 30 percent. The mean annual precipitation is 25 to 35 inches, and the mean annual temperature is about 42 to 45 degrees F.

Taxonomic classification: Medial over loamy, mixed, superactive, frigid Typic Haploxerands

Typical Pedon

Blankout coarse sandy loam, in an area of Blankout-Medici complex, 2 to 15 percent slopes, about 1.6 miles northwest of Longbell Fire Station; 50 feet west and 1,200 feet north of the southeast corner of sec. 7, T. 42 N., R. 5 E.; Whitehorse NW (Border Mountain) quadrangle (7.5 minute series):

Oi—1 inch to 0; recent and decomposed pine litter.

A1—0 to 4 inches; brown (10YR 5/3) coarse sandy loam, dark brown (7.5YR 3/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; few very fine interstitial pores; 10 percent fine gravel; slightly acid (pH 6.2); abrupt wavy boundary.

A2—4 to 9 inches; brown (7.5YR 5/4) coarse sandy loam, dark brown (7.5YR 3/4) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and common medium roots; few very fine interstitial pores; 10 percent fine gravel; slightly acid (pH 6.2); abrupt smooth boundary.

Bw1—9 to 18 inches; brown (7.5YR 5/4) coarse sandy loam, dark brown (7.5YR 3/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and few medium and coarse roots; few very fine interstitial pores; 10 percent fine gravel; slightly acid (pH 6.4); clear smooth boundary.

2Bw2—18 to 27 inches; brown (7.5YR 5/4) gravelly coarse sandy loam, dark brown (7.5YR 3/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and few medium and coarse roots; common very fine interstitial pores; 20 percent gravel; slightly acid (pH 6.4); gradual smooth boundary.

2Bw3—27 to 40 inches; strong brown (7.5YR 5/6)

gravelly coarse sandy loam, strong brown (7.5YR 4/6) moist; moderate medium subangular blocky structure; soft, friable, nonsticky and nonplastic; common fine and medium roots; few very fine tubular pores; 30 percent gravel; slightly acid (pH 6.4); gradual smooth boundary.

2Bw4—40 to 62 inches; brown (7.5YR 5/4) gravelly coarse sandy loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; soft, friable, nonsticky and nonplastic; common fine and medium roots; few very fine tubular pores; 30 percent gravel; slightly acid (pH 6.4); abrupt wavy boundary.

3C—62 to 81 inches; brown (7.5YR 5/4) extremely gravelly coarse sandy loam, dark brown (7.5YR 3/4) moist; moderate fine subangular blocky structure; soft, friable, nonsticky and nonplastic; few fine roots; few very fine tubular pores; 50 percent gravel and 20 percent cobbles; slightly acid (pH 6.4).

Depth to the base of the cambic horizon is more than 60 inches.

The A horizon has dry color of 10YR 5/3 or 6/3 or 7.5YR 5/4 or 6/4. Moist color is 7.5YR 3/2, 3/4, or 4/4 or 10YR 3/3 or 4/3. The content of rock fragments, mostly gravel, ranges from 5 to 15 percent. NaF pH ranges from 9.5 to 11.5. The content of organic matter ranges from 2 to 6 percent. Base saturation by ammonium acetate ranges from 60 to 75 percent. Glass in the 0.02 to 2.0 mm fraction ranges from 30 to 40 percent. The bulk density is 0.85 to 0.95 g/cc.

The Bw1 horizon has dry color of 7.5YR 5/4, 5/6, or 6/4 or 10YR 6/4 or 7/4. Moist color is 7.5YR 3/4, 4/4, or 4/6 or 10YR 4/4. The content of rock fragments, mostly gravel, ranges from 0 to 15 percent. Reaction is slightly acid or neutral. NaF pH ranges from 8.6 to 10.5. The content of organic matter ranges from 0.3 to 1.5 percent. Base saturation by ammonium acetate ranges from 75 to 85 percent. Glass in the 0.02 to 2.0 mm fraction is 5 to 30 percent. Extractable aluminum plus $^1/_2$ extractable iron ranges from 1.0 to 1.5.

The 2Bw horizon has dry color of 7.5YR 5/4, 5/6, or 6/4 or 10YR 6/4 or 7/4. Moist color is 7.5YR 3/4, 4/4, or 4/6 or 10YR 4/4. The content of clay ranges from 15 to 18 percent. The content of rock fragments, mostly gravel, ranges from 15 to 35 percent. Reaction is slightly acid or neutral. NaF pH ranges from 8.6 to 10.5. The content of organic matter ranges from 0.3 to 1.5 percent. Base saturation by ammonium acetate ranges from 75 to 85 percent.

The 3C horizon has dry color of 7.5YR 5/4 or 7/4. Moist color is 7.5YR 3/4 or 4/6. The content of clay ranges from 15 to 18 percent. The content of gravel ranges from 50 to 70 percent, and the content of cobbles ranges from 20 to 30 percent. NaF pH ranges from 8.4 to 9.5. The content of organic matter is 0.3 to 1.0 percent. Base saturation by ammonium acetate ranges from 80 to 90 percent.

Boardburn Series

The Boardburn series consists of deep, well drained soils that formed in colluvium from extrusive igneous rock. These soils are on lava plateaus and hills. Slopes range from 5 to 50 percent. The mean annual precipitation is 20 to 30 inches, and the mean annual temperature is about 45 to 48 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Ultic Haploxeralfs

Typical Pedon

Boardburn sandy loam, in an area of Hambone-Boardburn complex, 15 to 30 percent slopes, approximately 8 miles northwest of Bieber on the east side of the Big Valley Mountains; 2,500 feet north and 1,000 feet west of the southeast corner of sec. 14, T. 39 N., R. 6 E.; Bieber NW (Lookout) quadrangle (7.5 minute series):

A1—0 to 4 inches; yellowish brown (10YR 5/4) sandy loam, very dark grayish brown (10YR 3/2) moist; strong fine granular structure; slightly hard, very friable, nonsticky and nonplastic; common very fine roots and few fine and medium roots; common very fine interstitial pores; 5 percent gravel; slightly acid (pH 6.1); abrupt smooth boundary.

A2—4 to 9 inches; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 3/4) moist; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine and medium roots; common very fine interstitial and tubular pores; 5 percent gravel; slightly acid (pH 6.1); clear smooth boundary.

Bt1—9 to 15 inches; light brown (7.5YR 6/4) loam, dark brown (7.5YR 3/4) moist; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium and few coarse roots; common very fine interstitial and tubular pores; 5 percent gravel; NaF pH 8.5; slightly acid (pH 6.1); clear wavy boundary.

Bt2—15 to 22 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 4/4) moist; strong fine angular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine and fine and few

medium exped roots; common very fine tubular pores; common moderately thick clay films on peds and in pores; 5 percent gravel; slightly acid (pH 6.1); clear wavy boundary.

Bt3—22 to 40 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 4/4) moist; moderate medium angular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine and fine and few medium exped roots; common very fine tubular pores; common moderately thick clay films on faces of peds and lining pores; 10 percent gravel; slightly acid (pH 6.1); gradual wavy boundary.

2Bt4—40 to 50 inches; reddish yellow (7.5YR 6/6) very gravelly sandy clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few fine and medium exped roots; common very fine tubular pores; common moderately thick clay films on faces of peds and in pores; 45 percent gravel and 5 percent cobbles; slightly acid (pH 6.1); clear irregular boundary.

2Cr—50 to 55 inches; weathered andesitic tuff that can be easily dug with a spade and has identifiable rock structure; few roots.

The depth to paralithic contact ranges from 40 to 60 inches. The particle-size control section (9 to 29 inches) averages 27 to 35 percent clay, more than 45 percent sand, and 0 to 10 percent rock fragments, mostly gravel. Reaction is neutral or slightly acid.

The A horizon has dry color of 10YR 5/3 or 5/4 or 7.5YR 4/4, 5/4, or 6/4. Moist color is 10YR 3/2, 3/3, or 3/4; 7.5YR 3/2 or 3/4; or 5YR 3/4. The content of organic matter ranges from 1.1 to 4.0 percent. The content of clay ranges from 15 to 20 percent. The content of rock fragments, mostly gravel, ranges from 0 to 10 percent. NaF pH is 9.0 to 8.5. Base saturation by sum of cations ranges from 50 to 65 percent.

The Bt horizon has dry color of 10YR 4/4 or 7.5YR 5/4, 5/6, 4/6, or 6/4. Moist color is 7.5YR 3/4 or 4/4 or 5YR 3/4. The content of clay ranges from 25 to 35 percent. The content of rock fragments, mostly gravel, ranges from 0 to 10 percent. Base saturation by sum of cations ranges from 65 to 75 percent.

The 2Bt horizon has dry color of 7.5YR 5/6, 6/4, or 6/6 or 5YR 4/6. Moist color is 7.5YR 3/4 or 4/4 or 5YR 3/4 or 4/4. The content of clay ranges from 27 to 35 percent. The content of rock fragments, mostly gravel, ranges from 35 to 60 percent. Base saturation by sum of cations ranges from 65 to 75 percent.

Bollibokka Series

The Bollibokka series consists of shallow, well drained soils that formed in colluvium and residuum from tuffaceous sandstone. These soils are on lava plateaus and hills. Slopes range from 2 to 75 percent. The mean annual precipitation is 16 to 25 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Loamy, mixed, superactive, mesic Lithic Ultic Argixerolls

Typical Pedon

Bollibokka loam, 2 to 15 percent slopes, about 3 miles south of Fall River Mills on Fall River-Cassel Road, 2,000 feet west on dirt road and 50 feet east off dirt road; about 3,500 feet west and 1,200 feet north of the southeast corner of sec. 7, T. 36 N., R. 5 E.; Jellico NW (Hogback Ridge) quadrangle (7.5 minute series):

A—0 to 5 inches; yellowish brown (10YR 5/4) loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; many fine tubular pores; 5 percent gravel; neutral (pH 6.8); clear wavy boundary.

Bt1—5 to 9 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 3/2) moist; moderate fine subangular blocky structure; hard, friable, slightly sticky and plastic; common very fine and fine and few medium roots; many fine tubular pores; few thin clay films on peds and in pores; 5 percent gravel; neutral (pH 6.8); clear smooth boundary.

Bt2—9 to 15 inches; strong brown (7.5YR 4/6) gravelly clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; very hard, friable, slightly sticky and plastic; common fine and coarse roots; common fine tubular pores; common moderately thick clay films in pores and on peds; 25 percent gravel; neutral (pH 6.8); abrupt smooth boundary.

R1—15 to 27 inches; hard, horizontally fractured, tuffaceous sandstone; fractures are 5 to 7 inches apart and are filled with little soil material.

R2—27 inches; hard, tuffaceous sandstone.

The depth to bedrock ranges from 10 to 20 inches. The soils are slightly acid or neutral near the surface and are neutral in the lower horizons. Base saturation ranges from 50 to 75 percent.

The A horizon has dry color of 10YR 5/3 or 5/4

and moist color of 10YR 3/2 or 3/3. The content of rock fragments, mostly gravel, ranges from 5 to 15 percent.

The Bt horizon has dry color of 10YR 5/4 or 7.5YR 4/4 or 5/4 in the upper part and 10YR 6/4 or 7.5YR 4/6 in the lower part. Moist color is 10YR 4/4 or 7.5YR 3/2, 3/3, 3/4, or 4/4. The content of rock fragments, mostly gravel, ranges from 5 to 35 percent. The content of clay ranges from 27 to 35 percent.

Britton Series

The Britton series consists of shallow, well drained soils that formed in material weathered from diatomaceous rock. These soils are on dissected lacustrine terraces. Slopes range from 2 to 50 percent. The mean annual precipitation is 16 to 35 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Clayey, mixed, superactive, mesic, shallow Vitrandic Xerochrepts

Typical Pedon

Britton silty clay loam, 15 to 30 percent slopes, about 4 miles east of McArthur-Burney Falls State Park, 50 feet northwest of dirt road; 3,000 feet west and 300 feet north of the southeast corner of sec. 25, T. 37 N., R. 3 E.; Pondosa quadrangle (15 minute series):

A—0 to 3 inches; light brownish gray (10YR 6/2) silty clay loam, very dark brownish gray (10YR 3/2) moist; moderately fine subangular blocky structure; soft, very friable, slightly sticky and plastic; many very fine and fine roots; many very fine tubular pores; 1 percent gravel; moderately acid (pH 6.0); abrupt smooth boundary.

Bw1—3 to 8 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and plastic; many very fine and fine roots; many very fine and fine tubular and interstitial pores; 13 percent gravel and 2 percent cobbles; strongly acid (pH 5.5); clear wavy boundary.

Bw2—8 to 15 inches; light brownish gray (10YR 6/2) gravelly silty clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and plastic; many very fine and fine and few coarse roots; many very fine and fine tubular and interstitial pores; 20 percent gravel and 5 percent cobbles; strongly acid (pH 5.4); abrupt wavy boundary.

Cr—15 to 28 inches; highly fractured, soft diatomite; in place; cracks 1/2 inch to 2 inches apart and 1/4 to 1/2 inch wide; less than 10 percent soil filling the spaces.

The depth to paralithic contact ranges from 10 to 20 inches. The particle-size control section (10 to 15 inches) ranges from 35 to 40 percent clay and 15 to 35 percent rock fragments, mostly gravel. Mineralogy is mixed with small amounts of halloysitic and smectitic clays. The 15-bar water to clay ratio ranges from 0.61 to 0.78. NaF pH is 8.4 to 7.9. Reaction is moderately acid or strongly acid. Base saturation by ammonium acetate ranges from 70 to 90 percent. The CEC to clay ratio ranges from 0.64 to 0.87. Glass content ranges from 30 to 50 percent in the A horizon and the upper part of the Bw horizon.

The A horizon has dry color of 10YR 6/1 or 6/2. Moist color is 10YR 3/2 or 3/3. The texture is silty clay loam or silt loam. The content of clay ranges from 25 to 30 percent. The content of rock fragments, mostly gravel, ranges from 0 to 15 percent. The content of organic matter ranges from 3 to 7 percent.

The Bw horizon has dry color of 10YR 6/2, 7/2, or 8/2. Moist color is 10YR 3/4, 4/2, 4/3, or 4/4. The content of clay ranges from 30 to 40 percent. The content of rock fragments ranges from 0 to 15 percent in the upper part and from 15 to 35 percent in the lower part. The content of organic matter is 1 to 2 percent in the upper part and 0.5 to 1.0 percent in the lower part.

Bundora Series

The Bundora series consists of very deep, well drained soils that formed in slope alluvium derived from ash and tuff breccia. These soils are on lava plateaus and hills. Slopes range from 2 to 50 percent. The mean annual precipitation is 35 to 50 inches, and the mean annual temperature is 39 to 44 degrees F.

Taxonomic classification: Medial over loamy-skeletal, mixed, superactive, frigid Alfic Humic Haploxerands

Typical Pedon

Bundora sandy loam, in an area of Bundora-Goulder complex, 2 to 15 percent slopes, about 3.0 miles east and 4.8 miles south of Hambone; 3,000 feet south and 2,300 feet west of the northeast corner of sec. 28, T. 40 N., R. 2 E.; Hambone SW (Hambone) quadrangle (7.5 minute series):

Oi—1 inch to 0; partially decomposed and undecomposed needles, leaves, and twigs.

A1—0 to 3 inches; dark brown (7.5YR 3/2) sandy loam, dark reddish brown (5YR 3/2) moist; weak fine and medium granular structure; soft, very

friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine interstitial pores; 5 percent gravel; neutral (pH 7.0); clear smooth boundary.

A2—3 to 6 inches; dark brown (7.5YR 3/3) sandy loam, dark reddish brown (5YR 3/3) moist; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and common medium roots; many very fine and fine interstitial pores; 5 percent gravel; neutral (pH 6.8); clear smooth boundary.

Bw1—6 to 14 inches; dark brown (7.5YR 3/3) sandy loam, dark reddish brown (5YR 3/3) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; many very fine and fine interstitial pores; 5 percent gravel; neutral (pH 6.8); clear smooth boundary.

Bw2—14 to 29 inches; brown (7.5YR 4/3) sandy loam, dark reddish brown (5YR 3/3) moist; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few very fine and common fine and medium roots; common very fine, fine, and medium interstitial and tubular pores; 10 percent gravel; neutral (pH 6.8); clear wavy boundary.

2Btb1—29 to 38 inches; brown (7.5YR 4/4) very gravelly loam, dark brown (7.5YR 3/2) moist; moderate medium and coarse subangular blocky structure; very hard, very firm, sticky and plastic; few very fine and fine and common medium roots; common very fine and fine tubular pores; common moderately thick clay films on peds and in pores; 40 percent gravel; moderately acid (pH 5.9); gradual wavy boundary.

2Btb2—38 to 50 inches; brown (7.5YR 4/2) very gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium and coarse subangular blocky structure; very hard, very firm, sticky and plastic; few very fine and fine and common medium roots; common very fine and fine tubular pores; few thin clay films on peds and common moderately thick clay films in pores; 40 percent gravel; moderately acid (pH 5.7); gradual wavy boundary.

2Btb3—50 to 63 inches; grayish brown (10YR 5/2) very gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; few very fine and fine tubular and common very fine and fine interstitial pores; common thin clay films on peds and in pores; 40 percent gravel; strongly acid (pH 5.4).

The umbric epipedon is 10 to 29 inches thick. The volcanic ash layer ranges from 22 to 35 inches in thickness and has 0 to 15 percent gravel. Base saturation by sum of cations ranges from 24 to 35 percent in the upper 29 inches and from 35 to 49 percent between the depths of 29 and 63 inches.

The A horizon has dry color of 10YR 4/2 or 4/3 or 7.5YR 3/2 or 3/3. Moist color is 10YR 2/1 or 2/2, 7.5YR 3/2 or 3/4, or 5YR 3/2 or 3/3. The content of organic matter ranges from 4 to 8 percent. The content of rock fragments ranges from 5 to 15 percent, and the content of cobbles ranges from 0 to 5 percent. Base saturation by ammonium acetate ranges from 20 to 35 percent.

The Bw horizon has dry color of 7.5YR 3/3, 3/4, or 4/3. Moist color is 10YR 3/3, 7.5YR 3/4 or 4/4, or 5YR 3/3 or 3/4. The content of organic matter is 1 to 2 percent. The content of rock fragments ranges from 0 to 15 percent. The content of stones and boulders ranges from 0 to 5 percent. Base saturation by ammonium acetate ranges from 25 to 35 percent.

The 2Bt horizon has dry color of 10YR 5/2 or 7.5YR 4/2 or 4/4. Moist color is 10YR 3/2, 3/3, or 4/3; 7.5YR 3/2, 3/4, or 4/4; or 5YR 3/3 or 3/4. The content of organic matter averages less than 1 percent. The texture is very gravelly loam or very gravelly sandy clay loam. The content of clay ranges from 15 to 25 percent. The content of rock fragments, mostly gravel or cobbles, ranges from 20 to 45 percent. Base saturation by ammonium acetate ranges from 35 to 50 percent.

Bunselmeier Series

The Bunselmeier series consists of very deep, well drained soils that formed in cinders. These soils are on hills and cindercones. Slopes range from 15 to 30 percent. The mean annual precipitation is 12 to 16 inches, and the mean annual temperature is 45 degrees F.

Taxonomic classification: Loamy-skeletal, mixed, superactive, mesic Vitrandic Argixerolls

Typical Pedon

Bunselmeier very gravelly sandy loam, 15 to 30 percent slopes, about 11 miles southeast of Little Valley on a dirt road to Dixie Valley Ranch, 600 feet northwest of road to cinder pit; 500 feet east and 600 feet south of the northwest corner of sec. 36, T. 36 N., R. 8 E., Little Valley SE (Straylor Lake) quadrangle (7.5 minute series):

A—0 to 4 inches; brown (10YR 5/3) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; strong thick platy structure parting to moderate very fine subangular blocky; slightly hard, very friable, nonsticky and nonplastic; many very fine and common fine roots; many fine vesicular pores; 20 percent cinders and 20 percent basalt gravel; neutral (pH 6.9); abrupt smooth boundary.

BA—4 to 12 inches; brown (10YR 5/3) very gravelly sandy loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and few fine roots; many very fine tubular pores; 5 percent gravel-sized cinders, 30 percent basalt gravel, and 5 percent basalt cobbles; neutral (pH 6.9); clear wavy boundary.

Bt1—12 to 18 inches; brown (7.5YR 5/4) very gravelly sandy clay loam, dark brown (7.5YR 3/4) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; many very fine tubular pores; common thin clay films in pores; 35 percent gravel-sized cinders and 5 percent cobble-sized cinders; neutral (pH 6.9); abrupt wavy boundary.

Bt2—18 to 25 inches; strong brown (7.5YR 5/6) very gravelly sandy clay loam, dark brown (7.5YR 3/4) moist; weak very fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine, medium, and coarse roots; common very fine tubular pores; many thin clay films in pores; 45 percent gravel-sized cinders and 5 percent cobble-sized cinders; neutral (pH 6.9); clear wavy boundary.

C1—25 to 30 inches; strong brown (7.5YR 5/6) extremely gravelly sandy loam, dark brown (7.5YR 3/4) moist; massive; hard, friable, nonsticky and nonplastic; few fine roots; many very fine tubular pores; 60 percent gravel-sized cinders and 10 percent cobble-sized cinders; neutral (pH 7.0); clear irregular boundary.

C2—30 to 40 inches; strong brown (7.5YR 5/6) extremely gravelly sandy loam, strong brown (7.5YR 4/6) moist; massive; hard, friable, nonsticky and nonplastic; few fine roots; many very fine tubular pores; 70 percent gravel-sized cinders and 10 percent cobble-sized cinders; neutral (pH 7.0); clear wavy boundary.

C3—40 to 48 inches; strong brown (7.5YR 5/6) extremely gravelly sandy loam, strong brown (7.5YR 4/6) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; many very fine tubular pores; 93 percent gravel-sized cinders; neutral (pH 7.0); clear irregular boundary.

C4—48 to 62 inches; cinders with 5 percent sandy loam filling interstices less than 1 mm wide.

The thickness of the mollic epipedon ranges from 10 to 14 inches. The depth to unweathered cinders is 40 to 60 inches. The content of rock fragments on the surface, mostly gravel, ranges from 35 to 60 percent.

The A horizon has dry color of 10YR 5/3 or 5YR 5/3. Moist color is 10YR 3/2, 7.5YR 3/2, or 5YR 3/2. The content of organic matter is 2 to 5 percent. Reaction is neutral or slightly alkaline. The content of gravel ranges from 35 to 60 percent, by volume.

The BA horizon has dry color of 10YR 5/3 or 7.5YR 5/2. Moist color is 10YR 3/3, 7.5YR 3/2, or 5YR 3/2. The content of gravel ranges from 30 to 50 percent, and the content of cobbles ranges from 5 to 10 percent. Reaction is neutral or slightly alkaline.

The Bt horizon has dry color of 7.5YR 5/4, 5/6, or 4/4 or 5YR 4/3. Moist color is 7.5YR 3/4, 5YR 4/4, or 2.5YR 3/4. The content of clay averages 20 to 30 percent. The content of gravel ranges from 30 to 45 percent, and the content of cobbles ranges from 5 to 15 percent, by volume. Reaction is neutral or slightly alkaline.

The C horizon has dry color of 7.5YR 5/6, 10YR 5/6, or 5YR 4/6. Moist color is 7.5YR 3/4 or 4/6, 5YR 4/4 or 4/6, or 2.5YR 4/4. The texture is extremely gravelly sandy loam. The content of gravel ranges from 55 to 95 percent, and the content of cobbles ranges from 5 to 10 percent, by volume.

Burman Series

The Burman series consists of moderately deep, moderately well drained soils that formed in alluvium derived from extrusive igneous rock. These soils are on fan terraces and basin edges. Slopes range from 0 to 2 percent. The mean annual precipitation is 16 to 35 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Fine, smectitic, mesic Argic Duraquolls

Typical Pedon

Burman loam, in an area of Burman-Lasvar complex, 0 to 2 percent slopes, about 9 miles northwest of Lookout; 1,550 feet east and 2,300 feet north of the southwest corner of sec. 15, T. 40 N., R. 6 E., Whitehorse SE (Egg Lake) quadrangle (7.5 minute series):

A1—0 to 3 inches; grayish brown (10YR 5/2) loam,

very dark grayish brown (10YR 3/2) moist; strong medium prismatic structure parting to strong fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and coarse roots; common very fine tubular pores; neutral (pH 6.8); abrupt smooth boundary.

A2—3 to 7 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; strong coarse prismatic structure parting to strong medium subangular blocky; hard, firm, sticky and plastic; common fine and medium and few coarse roots; common very fine tubular pores; neutral (pH 6.8); abrupt smooth boundary.

Bt1—7 to 11 inches; gray (10YR 5/1) clay loam, very dark gray (10YR 3/1) moist; weak medium prismatic structure parting to weak fine angular blocky; very hard, very firm, sticky and plastic; few fine and medium roots; common very fine and few tubular pores; few thin clay films on faces of peds; 5 percent 3-mm manganese shot; neutral (pH 6.8); abrupt smooth boundary.

2Bt2—11 to 20 inches; light yellowish brown (10YR 6/4) clay, dark yellowish brown (10YR 4/4) moist; strong coarse prismatic structure parting to strong medium angular blocky; very hard, extremely firm, very sticky and very plastic; few fine and medium roots; few very fine tubular pores; many thick clay films on faces of peds; 5 percent 3-mm manganese shot; neutral (pH 7.0); clear smooth boundary.

2Bt3—20 to 29 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; strong medium angular blocky structure; very hard, extremely firm, sticky and very plastic; few fine roots; common very fine tubular pores; common moderately thick clay films on faces of peds; 3 percent 3-mm manganese shot; neutral (pH 7.0); abrupt smooth boundary.

2Bqm1—29 to 48 inches; strongly cemented duripan with 1-mm continuous silica cap; strong thin platy structure; brittle, extremely hard; roots matted on top of cap; neutral (pH 7.0); clear smooth boundary.

3Bqm2—48 to 72 inches; strongly cemented duripan with lenses of yellowish brown (10YR 5/4) gravelly sandy loam and gravelly sandy clay loam, dark yellowish brown (10YR 3/4) moist; weak thin platy structure; extremely hard, extremely firm; neutral (pH 7.0); gradual smooth boundary.

4C—72 to 80 inches; clayey lacustrine sediments.

Depth to the duripan ranges from 20 to 40 inches. The mollic epipedon is 10 to 15 inches thick and includes the upper part of the argillic horizon. The particle-size control section ranges from 35 to 55 percent clay. Some pedons have a surface layer of very cobbly loam.

The A horizon has dry color of 10YR 4/2 or 5/2. Moist color is 10YR 3/2 or 3/3 or 7.5YR 3/2. The content of organic matter is 1 to 2 percent. The content of clay ranges from 20 to 30 percent.

The Bt1 horizon has dry color of 10YR 5/1 or 5/2. Moist color is 10YR 3/1 or 3/2 or 7.5YR 3/2. The content of organic matter is 1 to 2 percent. The content of clay ranges from 30 to 35 percent.

The 2Bt2 and 2Bt3 horizons have dry color of 10YR 5/4 or 6/4 or 7.5YR 5/4. Moist color is 10YR 4/4 or 7.5YR 4/4. The content of organic matter is 0.6 to 1.0 percent. The content of clay ranges from 45 to 60 percent. Reaction is neutral or slightly alkaline.

The 2Bqm and 3Bqm horizons are neutral or slightly alkaline.

The Burman soils in map units 150 and 332 are taxadjuncts because they have a slightly lower content of organic carbon in the surface layer than is defined as the range for the series. These soils are classified as fine, smectitic, mesic Typic Duraqualfs.

Burney Series

The Burney series consists of deep, well drained soils that formed in slope alluvium derived from basalt. These soils are on lava plateaus. Slopes range from 2 to 9 percent. The mean annual precipitation is 16 to 25 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Fine-loamy, parasesquic, mesic Ultic Haploxeralfs

Typical Pedon

Burney gravelly loam, in an area of Burney-Arkright complex, 2 to 9 percent slopes, about 4 miles northeast of Burney, 1/2 mile west of Johnson Park, 50 feet north of major electric transmission line and 1/4 mile east of railroad tracks; 1,250 feet north and 1,250 feet west of the southeast corner of sec. 4, T. 35 N., R. 3 E., Burney NW (Burney) quadrangle (7.5 minute series):

Oi—1 inch to 0; pine needles in various stages of decomposition; abrupt smooth boundary.

A1—0 to 3 inches; brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 3/2) moist; strong fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine tubular pores; 20 percent gravel; slightly acid (pH 6.5); clear smooth boundary.

A2—3 to 8 inches; brown (7.5YR 5/4) gravelly loam,

dark brown (7.5YR 3/4) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; common very fine tubular pores; 20 percent gravel; slightly acid (pH 6.5); clear smooth boundary.

Bt1—8 to 15 inches; reddish brown (5YR 4/4) gravelly loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; hard, very friable, sticky and plastic; common very fine, fine, medium, and coarse roots; few very fine tubular pores; common thin clay films on peds and in pores; 20 percent gravel; moderately acid (pH 6.0); gradual smooth boundary.

Bt2—15 to 38 inches; reddish brown (5YR 4/4) gravelly clay loam, dark reddish brown (5YR 3/4) moist; moderate medium angular blocky structure; hard, very friable, sticky and plastic; few very fine, fine, medium, and coarse roots; few very fine tubular pores; common moderately thick clay films on peds and in pores; 30 percent gravel; moderately acid (pH 6.0); clear smooth boundary.

Bt3—38 to 59 inches; reddish brown (5YR 4/4) very stony clay loam, dark reddish brown (5YR 3/4) moist; weak medium angular blocky structure; hard, very friable, sticky and plastic; few very fine and fine roots; few very fine tubular pores; common moderately thick clay films on peds and in pores; 15 percent gravel, 15 percent cobbles, 20 percent stones; moderately acid (pH 6.0); abrupt wavy boundary.

Cr—59 to 60 inches; weathered, fractured vesicular basalt.

The depth to paralithic contact ranges from 40 to 60 inches. The particle-size control section (8 to 28 inches) averages 25 to 35 percent clay and 15 to 35 percent rock fragments, mostly gravel and cobbles. NaF pH is 8.5 to 9.0 and decreases with depth.

The A horizon has dry color of 7.5YR 4/2, 4/4, or 5/4 or 5YR 5/4 or 4/4. Moist color is 7.5YR 3/2 or 3/4 or 5YR 3/3. The content of organic matter ranges from 2 to 7 percent. The content of clay ranges from 18 to 25 percent. The content of rock fragments, mostly gravel, ranges from 15 to 25 percent. Base saturation by sum of cations ranges from 40 to 60 percent. Reaction is moderately acid or slightly acid. Some pedons have an AB or a BA horizon.

The Bt1 and Bt2 horizons have dry color of 5YR 4/4, 4/6, or 5/6. Moist color is 5YR 3/4 or 4/4 or 2.5YR 3/4 or 4/4. The texture is gravelly loam, gravelly clay loam, cobbly clay loam, or cobbly loam. The content of clay ranges from 25 to 35 percent. The content of rock fragments, mostly gravel or cobbles, ranges from 15 to 35 percent. The content of iron oxide ranges from 5.5 to 7.5 percent, and the iron oxide plus Gibbsite to clay ratio ranges from 0.20 to 0.25. Base saturation by sum of cations ranges from 35 to 75 percent. Reaction ranges from strongly acid to slightly acid.

The Bt3 horizon has dry color of 5YR 4/4, 4/6, or 5/6. The texture is very cobbly clay loam or very stony clay loam. The content of clay ranges from 27 to 40 percent. The content of rock fragments, mostly stones or cobbles, ranges from 35 to 60 percent. The content of iron oxide ranges from 5.5 to 7.5 percent, and the iron oxide plus Gibbsite to clay ratio ranges from 0.20 to 0.25. Reaction ranges from strongly acid to slightly acid.

Canyoncreek Series

The Canyoncreek series consists of deep, well drained soils that formed in tephra. These soils are on mountains. Slopes range from 2 to 50 percent. The mean annual precipitation is 20 to 25 inches, and the mean annual temperature is 38 to 43 degrees F.

Taxonomic classification: Medial over loamy-skeletal, mixed, superactive Xeric Haplocryands

Typical Pedon

Canyoncreek sandy loam, in an area of Hermit-Canyoncreek complex, 2 to 15 percent slopes, about 12 miles southeast of Canby on Warm Springs Drive, 10 feet west of road; 1,000 feet east and 1,050 feet north of the southwest corner of sec. 25, T. 40 N., R. 10 E., Canby SE (Hermit Butte) quadrangle (7.5 minute series):

Oi—3 inches to 0; recent and decomposing white fir needles, twigs, and branches.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) sandy loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; 10 percent gravel; moderately acid (pH 6.0); abrupt smooth boundary.

A2—4 to 9 inches; dark grayish brown and brown (10YR 4/2 and 7.5YR 4/2) sandy loam, very dark brown and dark brown (10YR 2/2 and 7.5YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few medium and common fine roots; many very fine interstitial pores; 10 percent gravel; slightly acid (pH 6.5); abrupt wavy boundary.

A3—9 to 19 inches; brown (10YR 4/3) sandy loam, very dark grayish brown (10YR 3/2) moist; weak

fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many medium and common fine and coarse roots; many very fine interstitial pores; 10 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

2Bw1—19 to 28 inches; brown (10YR 4/3) very stony loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; many medium and common fine and coarse roots; many very fine interstitial and few very fine tubular pores; 30 percent stones, 20 percent cobbles, 5 percent gravel; moderately acid (pH 6.0); gradual wavy boundary.

2Bw2—28 to 43 inches; brown (10YR 5/3) very stony loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common coarse and medium roots; common very fine tubular pores; 30 percent stones, 20 percent cobbles, 5 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

3BCt—43 to 58 inches; yellowish brown (10YR 5/4) extremely gravelly loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few medium and coarse roots; common very fine tubular pores; few thin clay films on faces of rocks; 70 percent weathered gravel; moderately acid (pH 6.0); clear wavy boundary.

4Cr—58 inches; soft, weathered andesite.

The depth to paralithic contact ranges from 40 to 60 inches. The thickness of the mollic epipedon ranges from 30 to 43 inches. The upper part of the profile is volcanic ash with less than 15 percent rock fragments. The lower part is dominated by 35 to 60 percent rock fragments, mostly cobbles and stones. NaF pH ranges from 11.5 to 9.4 and decreases with depth. Base saturation by ammonium acetate ranges from 50 to 75 percent. Reaction is slightly acid or moderately acid.

The A horizon has dry color of 10YR 4/2, 4/3, or 5/3 or 7.5YR 4/2. Moist color is 10YR 2/2 or 3/2 or 7.5YR 3/2. The content of rock fragments, mostly gravel, ranges from 0 to 15 percent. Bulk density ranges from 0.7 to 0.85 g/cc.

The 2Bw horizon has dry color of 10YR 4/3 or 5/3 or 7.5YR 5/2 or 5/4. Moist color is 10YR 3/3 or 4/3 or 7.5YR 3/2. The texture is very stony loam, very cobbly loam, or extremely cobbly loam. The content of clay ranges from 12 to 18 percent. The content of rock fragments, mostly cobbles or stones, ranges from 35 to 80 percent. Bulk density ranges from 0.85 to 1.2 g/cc.

The 3BCt horizon has dry color of 10YR 5/4, 6/2, or 6/4 or 7.5YR 5/4, 6/4, or 6/6. Moist color is 10YR 4/3 or 4/4 or 7.5YR 4/4, 3/4, or 4/6. The texture is extremely gravelly loam or very gravelly loam. The content of clay ranges from 18 to 27 percent. The content of rock fragments, mostly weathered gravel, ranges from 35 to 80 percent. Bulk density ranges from 1.0 to 1.2 g/cc.

Carberry Series

The Carberry series consists of deep, well drained soils that formed in tephra. These soils are on lava plateaus and hills. Slopes range from 2 to 50 percent. The mean annual precipitation is 35 to 45 inches, and the mean annual temperature is 39 to 41 degrees F.

Taxonomic classification: Medial-skeletal, mixed, frigid Typic Haploxerands

Typical Pedon

Carberry gravelly fine sandy loam, 2 to 15 percent slopes, about 8.5 miles south of Burney; 2,000 feet south and 400 feet east of the northwest corner of sec. 31, T. 34 N., R. 3 E., Burney SW (Burney Mountain West) quadrangle (7.5 minute series):

Oi—3 inches to 0; recent and decomposed litter.

A—0 to 5 inches; dark brown (10YR 4/3) gravelly fine sandy loam, dark brown (10YR 3/3) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; common very fine interstitial pores; 20 percent vesicular basaltic andesite gravel; moderately acid (pH 5.8); abrupt smooth boundary.

Bw1—5 to 12 inches; brown (7.5YR 5/4) gravelly fine sandy loam, dark brown (7.5YR 3/4) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine and common very fine and medium roots; common very fine interstitial pores; 25 percent vesicular basaltic andesite gravel; moderately acid (pH 6.0); abrupt smooth boundary.

Bw2—12 to 17 inches; brown (7.5YR 5/4) very gravelly fine sandy loam, dark brown (7.5YR 3/4) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and medium roots and common coarse roots; common very fine interstitial pores; 35 percent vesicular basaltic andesite gravel, 15 percent vesicular basaltic andesite cobbles; moderately acid (pH 6.0); clear wavy boundary.

Bw3—17 to 34 inches; brown (7.5YR 5/4) extremely gravelly loam, dark reddish brown (5YR 3/4) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine, medium, and coarse roots; common very fine interstitial pores; 45 percent basaltic vesicular andesite gravel, 20 percent basaltic vesicular andesite cobbles; moderately acid (pH 6.0); clear wavy boundary.

Bw4—34 to 50 inches; reddish yellow (7.5YR 7/6) extremely gravelly loam, strong brown (7.5YR 4/6) moist; weak very fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common medium and coarse roots; common very fine tubular pores; 65 percent vesicular basaltic andesite gravel; moderately acid (pH 6.0); gradual wavy boundary.

2R—50 inches; hard, fragmental basaltic andesite in a tuff matrix.

The depth to lithic contact ranges from 40 to 60 inches. Reaction is slightly acid or moderately acid.

The A horizon has dry color of 10YR 3/3, 4/3, or 4/4 or 7.5YR 4/2, 4/4, or 5/4. Moist color is 10YR 3/3 or 3/4; 7.5YR 3/2, 3/4, or 4/4; or 5YR 2.5/1 or 2.5/2. The content of organic matter ranges from 5 to 8 percent. The content of rock fragments, mostly gravel, ranges from 15 to 35 percent. NaF pH ranges from 10.5 to 11.5. Base saturation by ammonium acetate ranges from 10 to 25 percent. Bulk density is 0.50 to 0.70 g/cc.

The upper part of the Bw horizon has dry color of 7.5YR 4/4, 5/4, 5/6, or 6/6. Moist color is 7.5YR 3/4, 4/4, or 4/6 or 5YR 3/4 or 4/6. The content of organic matter ranges from 3 to 5 percent. The content of gravel ranges from 15 to 35 percent in the upper part. In the lower part, the content of gravel ranges from 30 to 50 percent and the content of cobbles ranges from 5 to 10 percent. NaF pH ranges from 10.0 to 11.0. Base saturation by ammonium acetate ranges from 10 to 25 percent. Bulk density is 0.80 to 0.90 g/cc.

The lower part of the Bw horizon has dry color of 10YR 5/4, 5/6, or 6/4 or 7.5YR 5/4 or 7/6. Moist color is 10YR 4/3 or 4/4, 7.5YR 4/6, or 5YR 3/4. The content of organic matter ranges from 2.5 to 5.0 percent. The content of rock fragments ranges from 60 to 80 percent percent. NaF pH ranges from 10.0 to 10.5. Base saturation by ammonium acetate ranges from 15 to 25 percent. Bulk density is 1.00 to 1.10 g/cc.

The Carberry soils in map units 128, 129, and 130 are taxadjuncts because they have lower rainfall and a slightly warmer mean annual soil temperature than are defined as the range for the series. These soils are classified as medial-skeletal, mesic Typic Haploxerands.

Chalkford Series

The Chalkford series consists of very deep, somewhat poorly drained soils that formed in alluvium derived from extrusive igneous rock. These soils are on stream terraces. Slopes range from 0 to 2 percent. The mean annual precipitation is 14 to 16 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Pachic Haploxerolls

Typical Pedon

Chalkford loam, 0 to 2 percent slopes, about 3.5 miles northeast of Adin; about 1,200 feet east and 1,200 feet north of the southwest corner of sec. 3, T. 39 N., R. 9 E., Adin NW (Adin) quadrangle (7.5 minute series):

Ap1—0 to 2 inches; dark grayish brown (10YR 4/2) loam, very dark gray (10YR 3/1) moist; moderate fine granular structure; slightly hard, friable, nonsticky and slightly plastic; common very fine and few coarse roots; common very fine tubular pores; slightly alkaline (pH 7.8); abrupt smooth boundary.

Ap2—2 to 9 inches; dark grayish brown (10YR 4/2) loam, very dark gray (10YR 3/1) moist; moderate fine angular blocky structure; hard, firm, nonsticky and slightly plastic; common very fine and fine and few coarse roots; common very fine tubular pores; slightly alkaline (pH 7.5); clear wavy boundary.

Bw1—9 to 18 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine angular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few very fine, fine, and coarse roots; common very fine tubular pores; slightly alkaline (pH 7.5); gradual wavy boundary.

Bw2—18 to 26 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine angular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common fine and medium roots; common very fine tubular pores; slightly alkaline (pH 7.5); clear wavy boundary.

Bw3—26 to 35 inches; gray (10YR 5/1) clay loam, dark brown (10YR 3/3) moist; moderate fine prismatic structure parting to moderate fine angular blocky; hard, firm, slightly sticky and plastic; few very fine and fine roots; few very fine

tubular pores; slightly alkaline (pH 7.6); gradual smooth boundary.

Bw4—35 to 62 inches; light gray (10YR 6/1) clay loam, dark brown (10YR 3/3) moist; few fine faint light brownish gray (2.5Y 6/2 moist) and dark greenish gray (5GY 4/1 moist) redoximorphic features; strong fine angular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; few very fine tubular pores; slightly alkaline (pH 7.8).

The combined thickness of the B horizon is 51 to 60 inches.

The particle-size control section averages 27 to 35 percent clay. Reaction is neutral or slightly alkaline. Base saturation by sum of cations ranges from 80 to 90 percent. The content of organic matter ranges from 2 to 4 percent to a depth of 26 inches. Redoximorphic features occur at a depth of 35 to 60 inches.

The Ap horizon has dry color of 10YR 4/1, 4/2, or 5/2. Moist color is 10YR 2/1, 3/1, or 3/2. The content of organic matter ranges from 2 to 4 percent. The content of clay ranges from 25 to 27 percent.

The upper part of the Bw horizon has dry color of 10YR 4/2, 5/1, or 5/3. Moist color is 10YR 3/2 or 3/3. The content of organic matter is 1 to 2 percent. The texture is clay loam or silty clay loam. The content of clay ranges from 27 to 35 percent.

The lower part of the Bw horizon has dry color of 10YR 6/1, 6/2, 6/3, 7/2, or 7/3. Moist color is 10YR 3/3, 4/2, 4/3, or 5/3. The texture is clay loam, silty clay loam, or clay. The content of clay ranges from 35 to 42 percent. Redoximorphic features are few or common, fine or medium, and faint or distinct. They have moist colors of 2.5YR 6/2, 2.5Y 4/2, 5Y 4/1, or 5GY 4/1.

Chatterdown Series

The Chatterdown series consists of very deep, well drained soils that formed in volcanic ash outwash deposited over basalt. These soils are on lava plateaus. Slopes range from 2 to 15 percent. The mean annual precipitation is about 40 to 60 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Medial over loamy, mixed, superactive, mesic Humic Haploxerands

Typical Pedon

Chatterdown fine sandy loam, in an area of Nikal-Chatterdown-Lava flows complex, 2 to 9 percent slopes, about 0.4 mile west of Fowler Campground entrance road, 0.2 mile north of oiled service road; 700 feet south and 1,300 feet east of the northwest corner of sec. 12, T. 39 N., R. 2 W., Shoeinhorse Mountain NE (Lake McCloud) quadrangle (7.5 minute series):

A1—0 to 3 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and common fine tubular pores; 10 percent fine gravel; slightly acid (pH 6.2); clear smooth boundary.

A2—3 to 15 inches; brown (10YR 4/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; common very fine and fine tubular pores; 10 percent fine gravel; slightly acid (pH 6.1); clear wavy boundary.

2Bw1—15 to 30 inches; brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; common very fine and few fine tubular pores; 10 percent fine gravel; slightly acid (pH 6.3); gradual smooth boundary.

2Bw2—30 to 47 inches; dark yellowish brown (10YR 4/4) fine sandy loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; common very fine and fine tubular pores; 10 percent fine gravel; slightly acid (pH 6.3); gradual smooth boundary.

3C—47 to 63 inches; yellowish brown (10YR 5/4) sandy loam, dark yellowish brown (10YR 4/4) moist; massive; hard, very firm, nonsticky and nonplastic; few very fine, fine, and medium roots; common very fine tubular pores; 10 percent fine gravel; slightly acid (pH 6.3); clear smooth boundary.

4R—63 inches; fractured basalt.

The depth to lithic contact is more than 60 inches. Base saturation by sum of cations ranges from 5 to 12 percent. Reaction is slightly acid or neutral.

The A horizon has dry color of 10YR 3/2, 4/2, 4/3, or 5/2. Moist color is 10YR 2/2, 3/2, or 3/3. The content of organic matter ranges from 8 to 12 percent. The texture is fine sandy loam. The content of rock fragments, mostly gravel, ranges from 5 to 15 percent.

The 2Bw horizon has dry color of 10YR 3/4, 4/2, 4/3, 4/4, 5/3, 5/4, or 6/3. Moist color is 10YR 3/3, 3/4, or 4/3 or 7.5YR 3/4 or 4/4. The content of organic matter ranges from 5 to 6 percent. The texture is sandy loam, fine sandy loam, gravelly sandy loam, or gravelly fine sandy loam. The content of clay ranges from 3 to 5 percent. The content of rock fragments, mostly gravel or cobbles, ranges from 10 to 35 percent.

The 3C horizon has dry color of 10YR 3/3, 4/3, 5/4, 6/3, or 6/4. Moist color is 10YR 3/4, 4/3, or 4/4. The texture is sandy loam or gravelly sandy loam. The content of rock fragments, mostly gravel or cobbles, ranges from 5 to 35 percent. The content of clay ranges from 3 to 5 percent.

Chirpchatter Series

The Chirpchatter series consists of very deep, well drained soils that formed in older ashfalls. These soils are on lava plateaus and hills. Slopes range from 2 to 50 percent. The mean annual temperature is 45 to 50 degrees F, and the mean annual precipitation is 16 to 25 inches.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Ultic Argixerolls

Typical Pedon

Chirpchatter sandy loam, in an area of Chirpchatter-Hunsinger complex, 2 to 15 percent slopes, about 2 miles north on Day Road from the intersection of Day Road and U.S. Highway 299, about 130 feet west of the road directly across from a cinder road; 1,200 feet east and 400 feet south of the northwest corner of sec. 13, T. 38 N., R. 5 E., Fall River Mills NE (Day) quadrangle (7.5 minute series):

Oi—1 inch to 0; undecomposed and partially decomposed forest litter.

A1—0 to 3 inches; yellowish brown (10YR 5/4) sandy loam, dark brown (10YR 3/3) moist; moderate medium and thick platy structure parting to moderate fine granular; hard, firm, slightly sticky and slightly plastic; many very fine roots; common very fine and fine tubular pores; 10 percent gravel; slightly acid (pH 6.4); abrupt wavy boundary.

A2—3 to 7 inches; yellowish brown (10YR 5/4) sandy loam, dark brown (10YR 3/3) moist; weak very thick platy structure parting to weak medium platy; hard, firm, slightly sticky and slightly plastic; common fine and many very fine roots; common very fine, fine, and medium tubular pores; 10 percent gravel; neutral (pH 6.6); clear wavy boundary.

Bt1—7 to 12 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common medium and coarse and many very fine roots; common fine and medium and many very fine tubular pores; many thin clay films on peds and in bridges between mineral grains; 10 percent gravel and 2 percent cobbles; neutral (pH 6.8); clear wavy boundary.

Bt2—12 to 32 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; moderate coarse subangular blocky structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; common very fine, medium, and coarse roots; common fine and medium and many very fine tubular pores; common thin clay films between mineral grains; 5 percent gravel; neutral (pH 6.8); clear wavy boundary.

Bt3—32 to 52 inches; brown (7.5YR 5/4) gravelly sandy loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; few coarse and common very fine, fine, and medium roots; common very fine and fine interstitial and common very fine tubular pores; few thin clay films on peds and many thin clay films as bridges between mineral grains; 15 percent gravel and 5 percent cobbles; neutral (pH 6.8); clear wavy boundary.

Bt4—52 to 70 inches; light yellowish brown (10YR 6/4) gravelly sandy loam, dark brown (7.5YR 4/4) moist; weak coarse and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine tubular pores; many thin clay films in pores and occurring as bridges between mineral grains; 10 percent gravel and 5 percent cobbles; neutral (pH 6.8).

The thickness of the mollic epipedon ranges from 10 to 16 inches. Base saturation ranges from 60 to 75 percent throughout. The particle-size control section averages 15 to 27 percent clay.

The A horizon has dry color of 10YR 4/4, 4/3, 5/2, 5/3, or 5/4 or 7.5YR 5/4 or 4/4. Moist color is 10YR 3/3 or 7.5YR 3/2, 3/3, or 3/4. The content of rock fragments, mostly gravel, ranges from 0 to 15 percent.

The upper part of the Bt horizon has dry color of 7.5YR 4/4, 5/2, or 5/4. Moist color is 7.5YR 3/2 or 5YR 3/3. The texture is sandy clay loam. The content of clay ranges from 15 to 27 percent. The content of rock fragments, mostly gravel, ranges from 5 to 20 percent. Reaction is slightly acid or neutral.

The lower part of the Bt horizon has dry color of 10YR 6/4; 7.5YR 5/6, 5/4, 7/3, or 7/4; or 5YR 4/4. Moist color is 10YR 3/4, 5/3, or 5/4; 7.5YR 4/4; or 5YR 3/4. The texture is gravelly sandy loam. The content of clay ranges from 15 to 27 percent. The content of rock fragments, mostly gravel, ranges from 5 to 20 percent. Reaction is slightly acid or neutral.

Coneward Series

The Coneward series consists of very deep, somewhat excessively drained soils that formed in eolian deposits and alluvial deposits from extrusive igneous rocks. These soils are on lava plateaus and hills. Slopes range from 2 to 50 percent. The mean annual precipitation is 16 to 22 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Mixed, mesic Typic Xeropsamments

Typical Pedon

Coneward loamy sand, 2 to 15 percent slopes, about 6 miles southeast of McArthur, 660 feet west of the intersection of Pittville Road and Cindercone Resource Area Road; 550 feet south and 750 feet west of the northeast corner of sec. 13, T. 36 N., R. 5 E., Jellico NE (Cable Mountain) quadrangle (7.5 minute series):

A1—0 to 4 inches; dark brown (10YR 4/3) loamy sand, very dark brown (10YR 2/2) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and few fine roots; many very fine interstitial pores; neutral (pH 6.8); gradual smooth boundary.

A2—4 to 8 inches; dark yellowish brown (10YR 4/4) loamy sand, dark yellowish brown (10YR 3/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and few fine roots; many very fine interstitial pores; neutral (pH 7.0); gradual smooth boundary.

Bt1—8 to 24 inches; dark brown (7.5YR 4/4) loamy sand, dark yellowish brown (10YR 3/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; many very fine interstitial and few very fine tubular pores; few thin clay films in bridges between mineral grains; neutral (pH 7.0); diffuse smooth boundary.

Bt2—24 to 50 inches; dark yellowish brown (10YR 4/4) loamy sand, dark yellowish brown (10YR 3/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and medium and few fine roots; few very fine tubular and common very fine interstitial pores; few thin clay films in bridges between mineral grains; neutral (pH 7.0); abrupt smooth boundary.

Btq—50 to 60 inches; light yellowish brown (10YR 6/4) loamy sand, dark brown (10YR 4/3) moist; weak thin and medium platy structure; extremely hard, very firm, slightly sticky and nonplastic; few very fine and fine roots; common very fine tubular pores; many thin clay films in bridges between mineral grains, on faces of peds, and in pores; weakly cemented by silica; slakes in water; neutral (pH 7.0).

Depth to the weakly cemented Btq horizon ranges from 40 to 60 inches. The particle-size control section (10 to 40 inches) ranges from 2 to 8 percent clay.

The A1 horizon has dry color of 7.5YR 5/3 or 4/4 or 10YR 5/3, 4/4, or 4/3. Moist color is 7.5YR 3/2 or 10YR 3/2 or 2/2. The A2 horizon has dry color of 10YR 4/4 or 7.5YR 6/4 or 5/4. Moist color is 7.5YR 3/4 or 4/4 or 10YR 3/4. The content of organic matter in the A horizons ranges from 0.5 to 1.0 percent. The content of clay ranges from 3 to 5 percent. Base saturation by ammonium acetate ranges from 60 to 70 percent.

The Bt horizon has dry color of 7.5YR 6/4, 5/4, 5/3, or 4/4 or 10YR 6/4 or 4/4. Moist color is 7.5YR 4/4, 4/3, or 3/4 or 10YR 4/4, 4/3, or 3/4. In some pedons the texture is cobbly loamy sand or stony loamy sand below a depth of 40 inches. The content of clay ranges from 3 to 5 percent. In some pedons the content of rock fragments, mostly cobbles or stones, ranges from 0 to 25 percent in the lower part. Base saturation by ammonium acetate ranges from 70 to 85 percent.

Cuppy Series

The Cuppy series consists of moderately deep, well drained soils that formed in alluvium derived from basalt and tuff. These soils are on lava plateaus. Slopes range from 2 to 15 percent. The mean annual precipitation is 14 to 16 inches, and the mean annual temperature is 45 to 50 degrees F.

Taxonomic classification: Fine, smectitic, mesic Chromic Durixererts

Typical Pedon

Cuppy cobbly clay (fig. 12), in an area of Lassen-Cuppy complex, 2 to 15 percent slopes, about 4 miles east of Dixie Valley Ranch headquarters on Dixie Ranch Road; 700 feet north and 700 feet west of the

southeast corner of sec. 14, T. 35 N., R. 8 E., Little Valley NE (Dixie Peak) quadrangle (7.5 minute series):

A1—0 to 2 inches; dark brown (10YR 3/3) cobbly clay, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; slightly hard, very friable, sticky and plastic; common very fine roots; many very fine interstitial pores; 15 percent cobbles; slightly alkaline (pH 7.6); abrupt smooth boundary.

A2—2 to 6 inches; dark grayish brown (10YR 4/2) clay, dark brown (10YR 3/3) moist; moderate fine and medium prismatic structure parting to moderate fine subangular blocky; hard, friable, sticky and plastic; common very fine, fine, and medium roots; common very fine tubular pores; thin continuous pressure faces; 10 percent cobbles; slightly alkaline (pH 7.6); clear smooth boundary.

Ass—6 to 18 inches; dark grayish brown (10YR 4/2) clay, dark brown (10YR 3/3) moist; moderate medium and coarse prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; common very fine and fine and few medium roots; common very fine and medium tubular pores; continuous pressure faces; few intersecting slickensides; 5 percent gravel and 5 percent cobbles; moderately alkaline (pH 8.0); gradual wavy boundary.

Bss—18 to 27 inches; brown (7.5YR 4/4) clay, dark brown (7.5YR 3/4) moist; moderate and coarse prismatic structure parting to moderate medium subangular blocky; extremely hard, firm, sticky and plastic; common very fine, fine, and medium roots; common very fine, fine, and medium tubular pores; continuous pressure faces; common intersecting slickensides; 5 percent gravel and 5 percent cobbles; moderately alkaline (pH 8.0); clear wavy boundary.

Bw—27 to 29 inches; strong brown (7.5YR 5/6) clay loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, sticky and slightly plastic; common very fine and medium roots; few very fine tubular pores; moderately alkaline (pH 8.0); abrupt wavy boundary.

2Bqm—29 to 31 inches; indurated silica cap 1 cm thick over cemented fine textured ash; few fine manganese concretions with platy structure.

3R—31 inches; hard basalt.

Depth to the duripan ranges from 20 to 38 inches, and the depth to bedrock ranges from 21 to 40 inches. The particle-size control section (10 inches to duripan) averages 35 to 60 percent clay and 0 to 25 percent rock fragments, mostly gravel and cobbles. The content of rock fragments on the surface, mostly cobbles, ranges from 15 to 25 percent. Base saturation ranges from 95 to 100 percent. Vertical cracks $^{1}/_{2}$ inch to 4 inches wide extend from the surface to a depth of 23 to 29 inches when the soil is dry. Few or common intersecting slickensides are in the lower part of the A horizon and the upper part of the Bss horizon.

The A horizon has dry color of 10YR 3/3, 4/2, 4/3, 5/2, or 5/3 or 7.5YR 3/2 or 4/2. Moist color is 10YR 2/2, 3/2, or 3/3 or 7.5YR 2.5/2 or 3/2. The content of rock fragments, mostly cobbles and gravel, ranges from 15 to 25 percent in the upper part and from 0 to 15 percent in the lower part. Reaction is neutral or slightly alkaline.

The Bss horizon has dry color of 7.5YR 4/4 or 5/4. Moist color is 7.5YR 3/4 or 4/4. The content of clay ranges from 40 to 60 percent. The content of rock fragments, mostly cobbles or gravel, ranges from 0 to 10 percent. Reaction is slightly alkaline or moderately alkaline. Wedge-shaped, tilted aggregates occur in this horizon.

The Bw horizon has dry color of 7.5YR 4/6 or 5/6. Moist color is 7.5YR 4/4 or 5/4. The texture is clay loam or clay. The content of clay ranges from 35 to 60 percent. The content of rock fragments ranges from 0 to 10 percent.

Cupvar Series

The Cupvar series consists of moderately deep, moderately well drained soils that formed in alluvium derived from extrusive igneous rock. These soils are in basins. Slopes range from 0 to 2 percent. The mean annual precipitation is 14 to 20 inches, and the mean annual temperature is 48 to 50 degrees F.

Taxonomic classification: Fine, smectitic, mesic Haplic Durixererts

Typical Pedon

Cupvar silty clay, 0 to 2 percent slopes, about 4.5 miles southeast of Fall River Mills; 4,225 feet east and 660 feet north of the southwest corner of sec. 19, T. 36 N., R. 5 E., Jellico NW (Hogback Ridge) quadrangle (7.5 minute series):

A—0 to 3 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; very hard, firm, sticky and very plastic; common very fine roots; few very fine interstitial pores; neutral (pH 6.8); gradual smooth boundary.

Bss—3 to 21 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2)

moist; strong coarse prismatic structure parting to strong medium angular blocky; extremely hard, firm, sticky and very plastic; many very fine and few fine roots; common very fine interstitial and tubular pores; common intersecting slickensides; neutral (pH 7.0); abrupt smooth boundary.

2Bkqm—21 to 25 inches; light yellowish brown (10YR 6/4), strongly cemented duripan, dark brown (10YR 3/3) moist; strong medium platy structure with thin continuous laminar cap 1/4 inch thick; extremely hard, very firm, and brittle; many very fine tubular pores; violently effervescent with lime and silica segregated in filaments and slightly effervescent matrix; moderately alkaline (pH 8.4); abrupt smooth boundary.

2Bk—25 to 41 inches; light yellowish brown (10YR 6/4) fine sandy loam, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure; hard, friable, nonsticky and nonplastic; many very fine and common fine tubular and many very fine interstitial pores; slightly effervescent; moderately alkaline (pH 8.2); gradual smooth boundary.

2C—41 to 64 inches; light yellowish brown (10YR 6/4) fine sandy loam, dark brown (7.5YR 3/4) moist; massive; hard, friable, nonsticky and nonplastic; many very fine tubular pores; moderately alkaline (pH 8.0).

Depth to the strongly cemented duripan ranges from 20 to 40 inches. The thickness of the mollic epipedon ranges from 20 to 40 inches. The particle-size control section (10 to 40 inches) ranges from 40 to 60 percent clay. Cracks range from 1/2 inch to 1 1/2 inches wide. They remain open during a period from July to October and remain closed for the rest of the year. Few or common intersecting slickensides are in part of the A horizon. Reaction in the A and Bss horizons is slightly alkaline or neutral. The content of organic matter ranges from 2 to 4 percent.

The Bk horizon has dry color of 10YR 6/4, 6/3, or 5/3. The texture is sandy clay loam, fine sandy loam, or sandy loam. Calcium carbonate equivalent ranges from 7 to 11 percent. Reaction is moderately alkaline or slightly alkaline.

Danhunt Series

The Danhunt series consists of very deep, well drained soils that formed in tephra. These soils are on mountains. Slopes range from 15 to 75 percent. The mean annual precipitation is 35 to 50 inches, and the mean annual temperature is 39 to 41 degrees F.

Taxonomic classification: Medial-skeletal, mixed, frigid Typic Vitrixerands

Typical Pedon

Danhunt gravelly sandy loam, 50 to 75 percent slopes, about 9 miles southwest of Burney on Danhunt Mountain; 2,000 feet south and 2,400 feet west of the northeast corner of sec. 34, T. 34 N., R. 2 E., Burney SW (Burney Mountain West) quadrangle (7.5 minute series):

Oi—3 inches to 0; recent and decomposed litter.

A—0 to 2 inches; brown (10YR 5/3) gravelly sandy loam, very dark brown (10YR 2/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; common very fine interstitial pores; 25 percent andesitic gravel; moderately acid (pH 6.0); abrupt wavy boundary.

Bw1—2 to 11 inches; pale brown (10YR 6/3) gravelly coarse sandy loam, dark yellowish brown (10YR 4/4) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and few fine and medium roots; common very fine interstitial pores; 25 percent andesitic gravel; slightly acid (pH 6.2); clear smooth boundary.

Bw2—11 to 22 inches; pale brown (10YR 6/3) very gravelly coarse sandy loam, dark yellowish brown (10YR 4/4) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and few medium and coarse roots; common very fine interstitial pores; 40 percent andesitic gravel; moderately acid (pH 6.0); gradual smooth boundary.

Bw3—22 to 38 inches; pale brown (10YR 6/3) very gravelly loamy coarse sand, brown or dark brown (10YR 4/3) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and few medium and coarse roots; common very fine interstitial pores; 50 percent andesitic gravel; moderately acid (pH 5.8); gradual smooth boundary.

C—38 to 61 inches; light gray (10YR 7/2) extremely gravelly coarse sandy loam, grayish brown (10YR 5/2) moist; massive; loose, nonsticky and nonplastic; few fine, medium, and coarse roots; common very fine interstitial pores; 70 percent andesitic gravel; NaF pH 10.5; moderately acid (pH 5.7).

Cr—61 to 70 inches; soft, weathered andesitic porphyry.

The depth to paralithic contact is more than 60 inches.

The A horizon has dry color of 10YR 5/2 or 5/3. Moist color is 10YR 2/2, 3/2, or 3/3 or 7.5YR 3/2. The

content of organic matter ranges from 5 to 10 percent. The content of rock fragments, mostly gravel, ranges from 15 to 35 percent. NaF pH is 10.5 to 11.5. Base saturation by ammonium acetate ranges from 10 to 20 percent. Reaction is slightly acid or moderately acid. Bulk density is 0.5 to 0.65 g/cc.

The Bw horizon has dry color of 10YR 6/3, 6/4, 7/2, or 7/3 or 7.5YR 6/4 or 7/3. Moist color is 10YR 4/4 or 7.5YR 4/4, 5/4, or 5/6. The content of organic matter ranges from 1 to 5 percent. The texture is sandy loam or coarse sandy loam. The content of rock fragments ranges from 15 to 35 percent in the upper part and from 35 to 60 percent in the lower part. NaF pH is 10.0 to 11.5. Base saturation by ammonium acetate ranges from 5 to 10 percent. Bulk density is 0.5 to 0.85 g/cc.

The C horizon has dry color of 10YR 6/3, 6/4, 7/2, or 7/3. Moist color is 10YR 4/3, 4/4, 5/2, or 5/4 or 7.5YR 4/4 or 5/4. The texture is very gravelly loamy coarse sand, extremely gravelly coarse sandy loam, or extremely gravelly loamy coarse sand. The content of rock fragments, mostly gravel and cobbles, ranges from 35 to 90 percent. NaF pH is 10.0 to 10.5. Base saturation by ammonium acetate ranges from 5 to 10 percent. Reaction ranges from slightly acid to strongly acid and decreases with depth. Some pedons have cemented cinder lenses and do not have a paralithic contact.

Daphnedale Series

The Daphnedale series consists of moderately deep, well drained soils that formed in lake deposits from basic igneous rocks. These soils are on stream terraces. Slopes range from 9 to 15 percent. The mean annual precipitation is 12 to 16 inches, and the mean annual temperature is 48 to 50 degrees F.

Taxonomic classification: Fine, smectitic, mesic Typic Argixerolls

Typical Pedon

Daphnedale loam, 9 to 15 percent slopes, about 4.5 miles southwest of Adin; 1,100 feet west and 1,200 feet north of the southeast corner of sec. 18, T. 38 N., R. 9 E., Adin NW (Adin) quadrangle (7.5 minute series):

A—0 to 3 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine tubular pores; slightly acid (pH 6.2); 5 percent gravel; abrupt smooth boundary.

Bt1—3 to 7 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; common very fine tubular pores; common thin clay films in pores; neutral (pH 6.6); clear smooth boundary.

Bt2—7 to 15 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common very fine and fine roots; common very fine tubular pores; many thin clay films in pores and on peds; neutral (pH 6.6); clear smooth boundary.

Bt3—15 to 25 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common very fine and fine roots; few very fine tubular pores; many moderately thick clay films in pores and on peds; neutral (pH 6.6); abrupt smooth boundary.

C—25 to 36 inches; very pale brown (10YR 7/3) sandy clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and plastic; few very fine and fine roots; few very fine tubular pores; neutral (pH 7.0); abrupt smooth boundary.

Cr1—36 to 50 inches; lacustrine tuff; sandy loam; massive; slightly hard, friable, nonsticky and nonplastic; abrupt smooth boundary.

Cr2—50 to 60 inches; lacustrine tuff; coarse sandy loam; massive; slightly hard, friable, nonsticky and nonplastic.

The depth to weathered lacustrine tuff ranges from 20 to 40 inches. Coarse and very coarse sand make up less than 15 percent of the A and B horizons. In some pedons, rock fragments make up as much as 35 percent of the volume. The fragments are mostly gravel, but as much as one-third of them are cobbles. The thickness of the solum ranges from 27 to 50 inches. Reaction is slightly acid or neutral in the upper horizons and neutral in the lower horizons. In some pedons, lenses of silt and redoximorphic features are in the lower part of the C horizon.

The A horizon has dry color of 10YR 4/2, 5/2, or 5/3. Moist color is 10YR 2/2, 3/2, or 3/3. The content of clay ranges from 18 to 25 percent. Reaction is slightly acid or neutral.

The Bt horizon has dry color of 10YR 4/2, 5/2, or 5/3 or 7.5YR 4/2. Moist color is 10YR 2/2, 3/2, or 3/3 or 7.5YR 3/2. The texture is clay loam or clay. The content of clay ranges from 35 to 50 percent.

The Daphnedale soils in this survey area are outside the range for the series because in most

pedons they are slightly acid in the A horizon and are neutral in the C horizon. These differences, however, do not significantly affect use and management of the soils.

Datom Series

The Datom series consists of shallow, well drained soils that formed in residuum from diatomaceous earth. These soils are on knolls. Slopes range from 2 to 9 percent. The mean annual precipitation is 14 to 16 inches, and the mean annual temperature is 48 to 50 degrees F.

Taxonomic classification: Clayey, mixed, superactive, mesic, shallow Vitrandic Argixerolls

Typical Pedon

Datom clay loam, 2 to 9 percent slopes, about 5.2 miles east of Bieber; about 800 feet north and 900 feet east of the southwest corner of sec. 22, T. 38 N., R. 8 E., Bieber SE (Hog Valley) quadrangle (7.5 minute series):

A—0 to 3 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; common very fine roots; common very fine tubular pores; 5 percent gravel; slightly acid (pH 6.6); abrupt smooth boundary.

Bw1—3 to 8 inches; grayish brown (10YR 5/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; common very fine roots throughout and few medium roots; few very fine tubular pores; 5 percent gravel; slightly acid (pH 6.8); clear smooth boundary.

Bw2—8 to 12 inches; grayish brown (10YR 5/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; few fine roots throughout and few medium roots; common very fine tubular pores; 5 percent gravel; neutral (pH 6.8); abrupt smooth boundary.

Bt—12 to 16 inches; light brownish gray (10YR 6/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; common very fine tubular pores; few thin clay films in pores; 5 percent diatomite gravel; neutral (pH 6.8); abrupt wavy boundary.

Crt—16 inches; weathered diatomaceous earth; common thin clay films on the upper surfaces of fractures; fractures 30 to 60 cm apart with soil filling 0.5-cm cracks.

The thickness of the mollic epipedon ranges from 8 to 14 inches. The depth to paralithic contact ranges from 10 to 20 inches.

The A horizon has dry color of 10YR 5/2 or 5/3. Moist color is 10YR 3/1 or 3/2. The content of rock fragments ranges from 0 to 5 percent. The content of clay ranges from 27 to 35 percent. The content of organic matter ranges from 4 to 9 percent.

The Bw horizon has dry color of 10YR 5/2 or 5/3. Moist color is 10YR 3/1 or 3/2. The content of rock fragments ranges from 0 to 5 percent. The content of clay ranges from 35 to 40 percent. The content of organic matter ranges from 2 to 4 percent.

The Bt horizon has dry color of 10YR 6/2 or 6/4. Moist color is 10YR 3/2 or 3/3. The content of rock fragments ranges from 5 to 15 percent. The content of clay ranges from 40 to 50 percent. The content of organic matter is 1 to 2 percent.

Dekkas Series

The Dekkas series consists of very deep, somewhat excessively drained soils that formed in outwash from tephra. These soils are on outwash plains between basaltic lava flows. Slopes range from 0 to 5 percent. The mean annual precipitation is 35 to 45 inches, and the mean annual temperature is 39 to 41 degrees F.

Taxonomic classification: Ashy, frigid Typic Vitrixerands

Typical Pedon

Dekkas fine sandy loam, 0 to 5 percent slopes, about 8 miles southeast of Burney; 1,200 feet north and 1,800 feet west of the southeast corner of sec. 19, T. 34 N., R. 4 E., Burney SE (Burney Mountain East) quadrangle (7.5 minute series):

Oi—2 inches to 0; recent and decomposed litter.

A—0 to 3 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; single grain; loose, nonsticky and nonplastic; many very fine and common fine roots; many very fine interstitial pores; 5 percent gravel; moderately acid (pH 5.6); abrupt smooth boundary.

Bw1—3 to 17 inches; pale brown (10YR 6/3) loamy sand, dark brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; many very fine and fine interstitial pores; 10 percent gravel; slightly acid (pH 6.5); gradual smooth boundary.

Bw2—17 to 34 inches; pale brown (10YR 6/3) loamy sand, dark brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; few very fine and medium and common fine and coarse roots; many very fine interstitial pores; 10 percent gravel; slightly acid (pH 6.5); gradual smooth boundary.

Bq—34 to 43 inches; pale brown (10YR 6/3) loamy sand, dark brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; weak rupture resistance; continuous very weak incipient silica cementation; few very fine and medium and common fine and coarse roots; many very fine interstitial pores; 10 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

C1—43 to 54 inches; pale brown (10YR 6/3) gravelly loamy sand, brown (10YR 4/3) moist; massive; loose, nonsticky and nonplastic; few very fine, fine, medium, and coarse roots; many very fine interstitial pores; 25 percent gravel; slightly acid (pH 6.5); abrupt wavy boundary.

C2—54 to 64 inches; pale brown (10YR 6/3) very gravelly loamy sand, brown (10YR 4/3) moist; massive; loose, nonsticky and nonplastic; few fine roots; many fine interstitial pores; 25 percent gravel and 15 percent cobbles; slightly acid (pH 6.5); abrupt wavy boundary.

Bb—64 to 80 inches; light brown (7.5YR 6/4) very cobbly sandy clay loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; common very fine tubular pores; 20 percent gravel, 20 percent cobbles, 5 percent stones; moderately acid (pH 6.0).

The depth to bedrock is more than 80 inches. The particle-size control section (10 to 40 inches) ranges from 3 to 10 percent clay and 5 to 30 percent rock fragments. Base saturation by ammonium acetate ranges from 30 to 57 percent. The content of volcanic glass ranges from 5 to 15 percent in the upper 40 inches.

The A horizon has dry color of 10YR 4/2, 5/2, or 5/3. Moist color is 10YR 3/2 or 3/3. The content of organic matter ranges from 8 to 12 percent. The content of rock fragments, mostly gravel, ranges from 0 to 15 percent. NaF pH ranges from 10.5 to 11.5. The content of glass and glass aggregates ranges from 5 to 12 percent. Bulk density ranges from 0.60 to 0.80 g/cc. Reaction is moderately acid or slightly acid.

The Bw horizon has dry color of 10YR 6/2, 6/3, 6/4, 7/2, 7/3, or 8/3. Moist color is 10YR 4/3, 4/4, or 6/4. The content of organic matter is 0.1 to 0.5 percent. The texture is loamy sand or loamy coarse sand. The content of rock fragments, mostly gravel, ranges from 5 to 15 percent. NaF pH ranges from 10.0 to 11.5.

The Bq horizon has dry color of 10YR 6/3, 6/4, or 7/2. Moist color is 10YR 4/3, 4/4, or 6/4. The content of organic matter is 0.1 to 0.5 percent. The texture is loamy sand or sandy loam. The content of rock fragments, mostly gravel, ranges from 5 to 15 percent. NaF pH ranges from 10.0 to 11.0.

The C horizon has dry color of 10YR 5/4, 6/3, or 6/4. Moist color is 10YR 3/4, 4/3, or 6/4. The content of organic matter is 0.1 to 0.5 percent. The texture is loamy sand or loamy coarse sand. The content of clay ranges from 3 to 10 percent. The content of rock fragments, mostly gravel, ranges from 15 to 30 percent, and the content of cobbles ranges from 5 to 15 percent. NaF pH is 10.0 to 10.5.

The Bb horizon has dry color of 7.5YR 6/4 or 6/6. Moist color is 7.5YR 4/4 or 6/4. The content of organic matter is 0.1 to 0.5 percent. The content of clay ranges from 27 to 35 percent. The content of rock fragments, mostly gravel, ranges from 15 to 25 percent; the content of cobbles ranges from 15 to 20 percent; and the content of stones ranges from 0 to 10 percent. NaF pH is 9.4 to 9.6. Reaction is moderately acid or slightly acid.

Depner Series

The Depner series consists of deep, well drained soils that formed in tephra. These soils are on lava plateaus and hills. Slopes range from 5 to 50 percent. The mean annual precipitation is 30 to 60 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Medial-skeletal, mixed, mesic Typic Haploxerands

Typical Pedon

Depner gravelly sandy loam, in an area of Wyntoon-Depner complex, 5 to 15 percent slopes, about 7.5 miles northwest of Burney; 2,000 feet north and 1,600 feet west of the southeast corner of sec. 29, T. 36 N., R. 2 E., Montgomery Creek NE (Chalk Mountain) quadrangle (7.5 minute series):

Oi—2 inches to 0; conifer needles.

A1—0 to 3 inches; yellowish brown (10YR 5/4) gravelly sandy loam, dark yellowish brown (10YR3/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; common very fine interstitial pores; 25 percent gravel; NaF pH 11.5; slightly acid (pH 6.5); clear smooth boundary.

A2—3 to 9 inches; yellowish brown (10YR 5/4) gravelly sandy loam, dark yellowish brown (10YR

3/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine, medium, and coarse roots; common very fine interstitial pores; 30 percent gravel; NaF pH 11.5; slightly acid (pH 6.5); gradual smooth boundary.

A3—9 to 16 inches; yellowish brown (10YR 5/4) gravelly sandy loam, dark brown (7.5YR 3/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine, medium, and coarse roots; common very fine interstitial pores; 30 percent gravel; NaF pH 10.0; slightly acid (pH 6.5); clear smooth boundary.

2Bw1—16 to 37 inches; brown (7.5YR 5/4) very cobbly sandy loam, dark brown (7.5YR 3/4) moist; massive; many medium, coarse, and very coarse roots; common very fine interstitial pores; 15 percent soft weathered gravel, 30 percent soft weathered cobbles, 5 percent soft weathered stones; NaF ph 9.0: slightly acid (pH 6.5); clear wavy boundary.

2Bw2—37 to 48 inches; light yellowish brown (10YR 6/4) very cobbly loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; common very fine interstitial pores; 15 percent soft weathered gravel, 30 percent soft weathered cobbles, 5 percent stones; NaF pH 9.0; moderately acid (pH 6.0); clear wavy boundary.

2Cr—48 inches; weathered volcanic breccia.

The depth to paralithic contact ranges from 40 to 60 inches. Some pedons have a C horizon, which is very gravelly or very cobbly sandy loam or loam.

The A horizon has dry color of 10YR 5/4, 5/3, 4/4, or 4/3 or 7.5YR 5/4 or 4/4. Moist color is 10YR 3/4 or 3/2 or 7.5YR 3/4. The content of organic matter ranges from 10 to 15 percent. The content of rock fragments ranges from 15 to 35 percent. NaF pH is 10.0 to 11.5. Reaction is moderately acid or slightly acid. Base saturation by sum of cations ranges from 5 to 35 percent. Bulk density ranges from 50 to 90 g/cc.

The 2Bw horizon has dry color of 10YR 7/3, 6/6, or 6/4 or 7.5YR 4/4, 5/4, 5/6, or 6/6. Moist color is 10YR 4/4 or 4/6; 7.5YR 3/4, 4/4, or 4/6; or 5YR 3/4. The content of organic matter ranges from 1 to 5 percent. The texture is very gravelly sandy loam, very gravelly loam, very cobbly sandy loam, or very cobbly loam. The content of rock fragments ranges from 35 to 60 percent. NaF pH is 9.0 to 10.0. Reaction ranges from strongly acid to slightly acid. Base saturation by sum of cations ranges from 5 to 40 percent.

Deven Series

The Deven series consists of shallow, well drained soils that formed in material weathered from extrusive igneous rock. These soils are on hills and plateaus. Slopes range from 2 to 50 percent. The mean annual precipitation is 14 to 16 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Clayey, smectitic, mesic Lithic Argixerolls

Typical Pedon

Deven very cobbly loam, 15 to 30 percent slopes, about 7.1 miles southwest of Canby; 900 feet north and 400 feet east of the southwest corner of sec. 24, T. 41 N., R. 10 E., Canby SE (Hermit Butte) quadrangle (7.5 minute series):

A—0 to 4 inches; brown (10YR 4/3) very cobbly loam, very dark brown (10YR 2/2) moist; strong medium platy structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine tubular and few fine interstitial pores; 30 percent cobbles and 20 percent gravel; neutral (pH 7.0); abrupt smooth boundary.

Bt1—4 to 9 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium angular blocky structure; hard, firm, slightly sticky and slightly plastic; common fine and few very fine roots; common very fine tubular pores; common thin clay films in pores; 10 percent gravel; neutral (pH 7.0); abrupt smooth boundary.

Bt2—9 to 15 inches; brown (10YR 4/3) clay, dark brown (7.5YR 3/2) moist; strong medium prismatic structure; very hard, very firm, very sticky and very plastic; few medium and common fine roots; few very fine tubular pores; many moderately thick clay films in pores; 5 percent gravel; neutral (pH 7.0); abrupt wavy boundary.

R—15 inches; hard tuff.

The depth to lithic contact ranges from 12 to 20 inches. The particle-size control section (4 to 15 inches) averages 35 to 40 percent clay and 5 to 10 percent rock fragments, mostly gravel. The content of rock fragments on the surface, mostly cobbles, ranges from 40 to 60 percent.

The A horizon has dry color of 10YR 4/2, 4/3, 5/2, or 5/3. Moist color is 10YR 2/2, 3/2, or 3/3 or 7.5YR 3/2. The content of clay ranges from 20 to 27 percent. The content of rock fragments, mostly cobbles, ranges from 35 to 60 percent.

The Bt horizon has dry color of 10YR 4/2, 4/3, 5/2, or 5/3 or 7.5YR 4/2 or 5/4. Moist color is 10YR 3/2 or 7.5YR 3/2, 3/4, or 4/4. The texture is clay loam, clay, or gravelly clay. The content of clay ranges from 35 to 50 percent. The content of rock fragments, mostly gravel, ranges from 10 to 25 percent.

Dosa Series

The Dosa series consists of moderately deep, somewhat poorly drained soils that formed in alluvium derived from lake sediments. These soils are on stream terraces. Slopes range from 0 to 2 percent. The mean annual precipitation is 35 to 50 inches, and the mean annual temperature is 45 to 50 degrees F.

Taxonomic classification: Fine, smectitic, mesic Xeric Epiaquerts

Typical Pedon

Dosa silty clay loam, in an area of Dosa-Burman complex, 0 to 2 percent slopes, about 2.7 miles southeast of Pondosa; 1,200 feet south and 1,800 feet west of the northeast corner of sec. 6, T. 38 N., R. 3 E., Pondosa NW (Pondosa) quadrangle (7.5 minute series):

A—0 to 4 inches; gray (10YR 6/1) silty clay loam, dark gray (10YR 4/1) moist; weak very fine subangular blocky structure; soft, very friable, slightly sticky and plastic; many very fine roots; few very fine interstitial pores; cracks $^1/_2$ inch wide; slightly acid (pH 6.1); abrupt smooth boundary.

Bss1—4 to 17 inches; light brownish gray (10YR 6/2) clay, dark grayish brown (10YR 4/2) moist; common fine distinct strong brown (7.5YR 5/6) iron accumulations, dark yellowish brown (10YR 3/6) moist; strong coarse prismatic structure; extremely hard, extremely firm, sticky and plastic; few very fine and common fine roots; few very fine tubular pores; cracks $^1/_2$ inch wide; common intersecting slickensides; slightly acid (pH 6.1); abrupt smooth boundary.

Bss2—17 to 28 inches; light brownish gray (10YR 6/2) clay, dark grayish brown (10YR 4/2) moist; many medium distinct dark yellowish brown (10YR 4/6) and dark red (2.5YR 3/6) iron accumulations, dark yellowish brown (10YR 3/6) moist; strong coarse prismatic structure; extremely hard, extremely firm, sticky and plastic; few fine and common very fine roots; few very fine tubular pores; cracks $^1/_2$ inch wide; common intersecting slickensides; 10 percent gravel; slightly alkaline (pH 7.5); clear smooth boundary.

2Cr1—28 to 37 inches; white (10YR 8/2), weathered diatomaceous earth, light gray (10YR 7/2) moist; few very fine and fine roots; moderately alkaline (pH 8.0); abrupt wavy boundary.

2Cr2—37 to 41 inches; diatomaceous earth with a few fractures filled with clay; slightly alkaline (pH 8.0); abrupt wavy boundary.

2Cr3—41 to 72 inches; diatomaceous earth with clay in fractures; moderately alkaline (pH 8.0).

The depth to paralithic contact ranges from 20 to 40 inches. The particle-size control section (10 to 28 inches) ranges from 45 to 55 percent clay. Cracks $^1/_2$ to $^3/_4$ inch wide extend to a depth of 28 to 30 inches when the soil is dry from about July 15 to September 30 (60 to 80 days).

The A horizon has dry color of 10YR 6/1, 6/2, or 7/2. Moist color is 10YR 4/1 or 4/2. The content of organic matter ranges from 2 to 3 percent. The content of clay ranges from 35 to 40 percent.

The Bss horizon has dry color of 10YR 6/1, 6/2, or 7/1. Moist color is 10YR 4/1 or 4/2. The content of organic matter is 1 to 2 percent. The texture is clay or silty clay. The content of clay ranges from 45 to 55 percent. The content of rock fragments, mostly fine gravel, ranges from 0 to 10 percent. Reaction is slightly acid in the upper part and neutral or slightly alkaline in the lower part.

Dotta Series

The Dotta series consists of very deep, well drained soils that formed in alluvium derived from extrusive igneous rock and lake sediments. These soils are on stream terraces. Slopes range from 0 to 30 percent. The mean annual precipitation is 12 to 20 inches, and the mean annual temperature is 47 to 52 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Pachic Argixerolls

Typical Pedon

Dotta sandy loam, 2 to 5 percent slopes, about 3.2 miles northwest of Fall River Mills, 1,200 feet northeast of Fall River; 300 feet east and 800 feet north of the southwest corner of sec. 14, T. 37 N., R. 4 E., Fall River Mills SW (Fall River Mills) quadrangle (7.5 minute series):

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) sandy loam, very dark gray (10YR 3/1) moist; weak very fine subangular blocky structure; loose, very friable, nonsticky and nonplastic;

common very fine and fine roots; few very fine tubular pores; slightly acid (pH 6.5); abrupt smooth boundary.

BAt—7 to 16 inches; dark grayish brown (10YR 4/2) sandy loam, dark brown (7.5YR 3/2) moist; strong medium subangular blocky structure; very hard, firm, slightly sticky and slightly plastic; common very fine roots; few fine interstitial and many very fine tubular pores; neutral (pH 6.8); abrupt smooth boundary.

Bt1—16 to 26 inches; grayish brown (10YR 5/2) sandy clay loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; common very fine roots; few fine interstitial and many very fine tubular pores; common thin clay films in pores; neutral (pH 6.8); clear smooth boundary.

Bt2—26 to 35 inches; brown (7.5YR 5/2) sandy clay loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular pores; common thin clay films in pores; neutral (pH 7.0); clear smooth boundary.

Bt3—35 to 47 inches; grayish brown (10YR 5/2) sandy clay loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; very hard, friable, sticky and slightly plastic; few very fine roots; common very fine tubular pores; few moderately thick clay films on peds and common thin clay films in pores; neutral (pH 7.0); abrupt smooth boundary.

Bt4—47 to 53 inches; pale brown (10YR 6/3) sandy loam, dark brown (10YR 4/3) moist; weak very fine subangular blocky structure; hard, friable, nonsticky and nonplastic; many very fine tubular pores; few thin clay films in pores; neutral (pH 7.0); abrupt smooth boundary.

C1—53 to 58 inches; very pale brown (10YR 7/3) sandy loam, dark yellowish brown (10YR 4/4) moist; massive; hard, very firm, nonsticky and nonplastic; common very fine tubular pores; few thin clay films in pores; neutral (pH 7.0); clear wavy boundary.

C2—58 to 75 inches; light gray (10YR 7/2) sandy loam, dark yellowish brown (10YR 4/4) moist; massive; extremely hard, nonsticky and nonplastic; few very fine tubular pores; few thin clay films in pores; neutral (pH 7.0).

The depth to mixed alluvial deposits is greater than 60 inches. The particle-size control section (16 to 36 inches) averages 18 to 27 percent clay. Base saturation by ammonium acetate ranges from 75 to 90 percent. The content of organic matter ranges from 2 to 3 percent to a depth of 26 inches.

The Ap horizon has dry color of 10YR 4/1, 4/2, 5/1, or 5/2. Moist color is 10YR 2/1, 2/2, 3/1, or 3/2 or 7.5YR 3/2. The texture is sandy loam or loam. The content of clay ranges from 15 to 25 percent. Reaction is slightly acid or neutral.

The Bt horizon has dry color of 10YR 4/2, 5/2, or 6/3 or 7.5YR 4/2, 5/2, or 5/4. Moist color is 10YR 3/2, 4/2, or 4/3 or 7.5YR 3/2 or 4/2. The content of clay ranges from 22 to 27 percent.

The C horizon has dry color of 10YR 6/3, 7/2, or 7/3. Moist color is 10YR 4/2, 4/3, or 4/4. The texture is sandy loam, coarse sandy loam, sandy clay loam, or gravelly sandy clay loam. The content of clay ranges from 10 to 25 percent. The content of rock fragments, mostly gravel, ranges from 0 to 25 percent.

Dudgen Series

The Dudgen series consists of shallow, moderately well drained soils that formed in alluvium derived from extrusive igneous rock. These soils are on stream terraces. Slopes range from 0 to 5 percent. The mean annual precipitation is 16 to 20 inches, and the mean annual temperature is 50 to 52 degrees F.

Taxonomic classification: Clayey, smectitic, mesic, shallow Typic Durixeralfs

Typical Pedon

Dudgen loam, in an area of Dudgen-Graven complex, 0 to 5 percent slopes, about 1.2 miles northwest of Fall River Mills; 50 feet west and 550 feet south of the northeast corner of sec. 25, T. 37 N., R. 4 E., Fall River Mills SW (Fall River Mills) quadrangle (7.5 minute series):

A—0 to 4 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; strong medium platy structure parting to moderate medium angular blocky; hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; many fine tubular and few medium vesicular pores; neutral (pH 7.0); abrupt smooth boundary.

Bt1—4 to 8 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; weak fine prismatic structure parting to moderate fine subangular blocky; very hard, firm, slightly sticky and slightly plastic; few very fine and common fine roots; many very fine tubular pores; few moderately thick clay films on peds and common thin clay films in pores; neutral (pH 7.0); abrupt smooth boundary.

Bt2—8 to 15 inches; brown (10YR 5/3) clay, dark

brown (10YR 4/3) moist; strong medium prismatic structure; extremely hard, very firm, slightly sticky and plastic; few very fine roots; common very fine tubular pores; common moderately thick clay films in pores; neutral (pH 7.0); abrupt smooth boundary.

2Bqm—15 to 19 inches; duripan, indurated with a continuous silica-cemented cap $^{1}/_{8}$ to $^{1}/_{4}$ inch thick underlain by extremely hard coarse alluvial material; platy structure; very firm when moist.

2Bq—19 to 27 inches; light gray (10YR 7/2) very fine sandy loam, dark brown (10YR 5/3) moist; massive; very hard, firm, nonsticky and nonplastic; few very fine tubular pores; moderately alkaline (pH 8.0); clear smooth boundary.

2C1—27 to 37 inches; light gray (10YR 7/2) very fine sandy loam, brown (10YR 5/3) moist; massive; very hard, friable, nonsticky and nonplastic; few very fine tubular pores; moderately alkaline (pH 8.0); clear smooth boundary.

2C2—37 to 54 inches; light gray (10YR 7/2) loamy sand, dark brown (10YR 4/3) moist; few fine distinct yellowish red (5YR 5/6) iron accumulations, reddish brown (5YR 4/4) moist; massive; very hard, friable, nonsticky and nonplastic; few very fine tubular pores; slightly alkaline (pH 8.0); clear smooth boundary.

2C3—54 to 120 inches; stratified sandy loam, loamy sand, very fine sandy loam, and silt loam.

Depth to the duripan ranges from 10 to 20 inches. The depth to stratified alluvium ranges from 12 to 34 inches. The particle-size control section averages 40 to 60 percent clay. Base saturation ranges from 90 to 100 percent.

The A horizon has dry color of 10YR 6/2, 6/3, 7/1, or 7/3. Moist color is 10YR 4/2 or 4/3 or 7.5YR 4/2 or 4/4. The content of clay ranges from 20 to 27 percent.

The Bt horizon has dry color of 10YR 5/3, 6/2, 6/3, or 7/1 or 7.5YR 5/4 or 6/6. Moist color is 10YR 4/2, 4/3, or 4/4 or 7.5YR 4/2 or 4/4. The upper part is clay loam and contains 27 to 35 percent clay. The lower part is clay and contains 40 to 60 percent clay. The content of clay throughout the Bt horizon averages more than 40 percent. Reaction is neutral or slightly alkaline.

The 2Bqm horizon has a continuous silica cap $^{1}/_{8}$ to $^{1}/_{4}$ inch thick underlain by 2 to 12 inches of extremely firm or very firm coarse alluvium that is slightly or moderately brittle and has platy structure or is massive.

The 2Bq and 2C horizons are stratified loamy sand to silt loam. Reaction ranges from neutral to moderately alkaline.

The Dudgen soils in map units 266 and 286 are taxadjuncts because they have a thicker subsoil than is defined as the range for the series. These soils are classified as clayey, smectitic, mesic Typic Durixeralfs.

Erig Series

The Erig series consists of deep, well drained soils that formed in colluvium from extrusive igneous rock. These soils are on hills. Slopes range from 15 to 50 percent. The mean annual precipitation is 16 to 25 inches, and the mean annual temperature is 39 to 44 degrees F.

Taxonomic classification: Loamy-skeletal, mixed, superactive, frigid Pachic Argixerolls

Typical Pedon

Erig gravelly loam, in an area of Trojan-Erig complex, 15 to 30 percent slopes, approximately 3.3 miles southeast of Hayden Hill Lookout; about 2,000 feet north and 1,600 feet east of the southwest corner of sec. 17, T. 36 N., R. 10 E., Hayden Hill NE (Said Valley) quadrangle (7.5 minute series):

Oi—1 inch to 0; decomposing pine needles and litter.

A—0 to 6 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; few medium and coarse and common very fine and fine roots; few medium and coarse interstitial and common very fine and fine tubular pores; 20 percent gravel; neutral (pH 7.0); clear smooth boundary.

ABt—6 to 19 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; common very fine and fine tubular and medium and coarse interstitial pores; few thin clay films on peds and in pores; 20 percent gravel; neutral (pH 6.8); gradual smooth boundary.

Bt1—19 to 30 inches; dark brown (10YR 4/3) very cobbly clay loam, dark brown (7.5YR 3/2) moist; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine and fine and common medium and coarse roots; common medium and coarse and many fine tubular pores; few thin clay films on peds and common thin clay films in pores; 15 percent gravel and 25 percent cobbles; neutral (pH 6.8); clear smooth boundary.

Bt2—30 to 48 inches; yellowish brown (10YR 5/4) very cobbly clay loam, dark brown (7.5YR 4/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; few fine and common medium roots; common medium and many fine tubular pores; common thin clay films in bridges between mineral grains and in pores; few clay lamellae; 15 percent gravel and 30 percent cobbles; neutral (pH 6.8); abrupt wavy boundary.

2R—48 inches; conglomerate tuff with 35 percent embedded semirounded and angular andesitic gravel and cobbles.

The depth to lithic contact ranges from 40 to 60 inches. The mollic epipedon ranges from 20 to 30 inches in thickness and includes the upper part of the Bt horizon. The particle-size control section averages 27 to 35 percent clay and 35 to 60 percent rock fragments, mostly cobbles and gravel. Base saturation by sum of cations ranges from 75 to 80 percent. The content of organic matter ranges from 2 to 4 percent to a depth of 30 inches. Reaction is slightly acid or neutral.

The A and ABt horizons have dry color of 10YR 3/3, 4/2, or 4/3. Moist color is 10YR 2/2 or 3/2 or 7.5YR 3/2. The content of clay ranges from 20 to 27 percent. The content of rock fragments, mostly gravel, ranges from 15 to 35 percent.

The Bt horizon has dry color of 10YR 4/3, 4/4, or 5/4 or 7.5YR 4/4 in the lower part. Moist color is 10YR 4/2, 4/4, 5/2, or 5/4 or 7.5YR 5/2 or 4/4 in the lower part. The content of clay ranges from 27 to 35 percent. The content of rock fragments, mostly cobbles and gravel, ranges from 35 to 60 percent.

Esperanza Series

The Esperanza series consists of deep, well drained soils that formed in alluvium derived from tuff, basalt, and diatomite. These soils are on stream terraces. Slopes range from 0 to 5 percent. The mean annual precipitation is 12 to 18 inches, and the mean annual temperature is 48 to 52 degrees F.

Taxonomic classification: Fine, smectitic, mesic Pachic Argixerolls

Typical Pedon

Esperanza sandy loam, 2 to 5 percent slopes, about 1 mile northeast of Fall River Mills on a north-facing slope; 100 feet south and 1,200 feet west of the northeast corner of sec. 30, T. 37 N., R. 5 E., Fall River Mills SW (Fall River Mills) quadrangle (7.5 minute series):

A1—0 to 3 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak thin platy structure parting to moderate very fine subangular blocky; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; many very fine tubular pores; neutral (pH 7.0); clear smooth boundary.

A2—3 to 6 inches; brown (10YR 5/3) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine and fine tubular pores; slightly alkaline (pH 7.5); clear wavy boundary.

Bt1—6 to 12 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate fine subangular blocky; very hard, friable, sticky and plastic; common very fine and few medium roots; common very fine and fine tubular pores; common moderately thick clay films on peds and in pores; slightly alkaline (pH 7.5); abrupt smooth boundary.

Bt2—12 to 30 inches; yellowish brown (10YR 5/4) clay, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; very hard, friable, sticky and plastic; common very fine and few medium roots; common very fine and fine tubular pores; common moderately thick clay films on peds and in pores; slightly alkaline (pH 7.5); gradual wavy boundary.

Bt3—30 to 44 inches; light yellowish brown (10YR 6/4) sandy clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; many moderately thick clay films on peds and common moderately thick clay films in pores; slightly alkaline (pH 7.5); gradual smooth boundary.

C1—44 to 53 inches; light yellowish brown (10YR 6/4) sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many very fine tubular pores; slightly alkaline (pH 7.5); abrupt smooth boundary.

C2—53 to 58 inches; very pale brown (10YR 7/4) sandy loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; hard, friable, nonsticky and nonplastic; few very fine roots; common very fine tubular pores; slightly alkaline (pH 7.5); abrupt smooth boundary.

2Cqm—58 to 61 inches; very pale brown (10YR 7/4)

sandy loam, dark brown (7.5YR 3/4) moist; strong thin platy structure parting to strong fine angular blocky; extremely hard, slightly brittle; few very fine roots; many very fine tubular pores; slightly alkaline (pH 7.5).

Depth to the duripan ranges from 40 to 60 inches. The particle-size control section (6 to 26 inches) averages 35 to 50 percent clay.

The A horizon has dry color of 10YR 4/2, 4/3, 5/2, or 5/3. Moist color is 10YR 3/2, 2/2, or 2/3 or 7.5YR 3/2. The content of organic matter ranges from 2 to 5 percent. The texture is loam or sandy loam. The content of clay ranges from 15 to 27 percent. The content of rock fragments, mostly gravel, ranges from 0 to 10 percent. Reaction is slightly acid or neutral.

The Bt horizon has dry color of 10YR 5/2, 5/3, 5/4, 6/4, or 7/4. Moist color is 10YR 3/2, 3/3, or 4/4 or 7.5YR 3/2, 3/4, or 4/4. The content of organic matter ranges from 0.5 to 2.0 percent. The content of clay ranges from 25 to 50 percent in the upper part and from 25 to 35 percent in the lower part. Reaction is neutral or slightly alkaline.

The C horizon has dry color of 10YR 6/4 or 7/4. Moist color is 10YR 3/3 or 3/4 or 7.5YR 4/4 or 3/4. The content of organic matter is less than 0.5 percent. The texture is sandy loam, coarse sandy loam, or loamy sand. The content of clay ranges from 5 to 15 percent. The content of rock fragments, mostly gravel, ranges from 0 to 15 percent.

Esro Series

The Esro series consists of very deep, very poorly drained soils that formed in alluvium weathered from extrusive igneous rock. These soils are in basins. Slopes range from 0 to 2 percent. The mean annual precipitation is 20 to 25 inches, and the mean annual temperature is 41 to 45 degrees F.

Taxonomic classification: Fine-silty, mixed, superactive, frigid Aquandic Endoaquolls

Typical Pedon

Esro silt loam, gravelly substratum, 0 to 2 percent slopes, about 9.5 miles northeast of Adin, on Sweagert Flat; about 1,600 feet east and 1,000 feet north of the southwest corner of sec. 12, T. 39 N., R. 10 E., Adin NE (Ambrose Valley) quadrangle (7.5 minute series):

A1—0 to 3 inches; dark grayish brown (10YR 4/2) silt loam, black (10YR 2/1) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; few very fine roots; many very fine interstitial pores; slightly acid (pH 6.5); abrupt smooth boundary.

A2—3 to 9 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; few fine distinct dark yellowish brown (10YR 4/6) iron accumulations, dark brown (7.5YR 3/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; common very fine tubular pores; slightly acid (pH 6.5); clear smooth boundary.

A3—9 to 22 inches; dark gray (10YR 4/1) silt loam, very dark gray (10YR 3/1) moist; few fine distinct dark yellowish brown (10YR 4/6) iron accumulations, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common fine and medium roots; few very fine tubular pores; slightly acid (pH 6.5); gradual smooth boundary.

A4—22 to 40 inches; grayish brown (10YR 5/2) silty clay loam, very dark gray (10YR 3/1) moist; common fine distinct dark yellowish brown (10YR 4/6) iron accumulations, dark brown (7.5YR 3/4) moist; moderate medium prismatic structure; slightly hard, firm, slightly sticky and slightly plastic; few fine roots; few very fine tubular pores; neutral (pH 6.8); abrupt smooth boundary.

C1—40 to 43 inches; light gray (10YR 7/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; many medium distinct yellowish brown (10YR 5/6) iron accumulations, dark yellowish brown (10YR 3/6) moist; massive; slightly hard, firm, slightly sticky and slightly plastic; few fine roots; few very fine tubular pores; 10 percent gravel; neutral (pH 6.8); gradual smooth boundary.

C2—43 to 60 inches; light gray (10YR 7/2) very gravelly sandy clay loam, dark grayish brown (10YR 4/2) moist; many medium distinct yellowish brown (10YR 5/6) iron accumulations, dark yellowish brown (10YR 3/6) moist; massive; slightly hard, firm, slightly sticky and slightly plastic; few fine roots; few very fine tubular pores; 50 percent gravel; neutral (pH 6.8).

The depth to stratified alluvium ranges from 40 to 60 inches. The particle-size control section (10 to 40 inches) averages 18 to 27 percent clay and has 60 to 75 percent silt plus very fine sand. Base saturation by sum of cations ranges from 80 to 90 percent. The content of organic matter ranges from 2 to 6 percent to a depth of 36 inches. The depth to a fluctuating water table is 0 to 2 feet from December through July. Occasional flooding occurs from January through April for long periods of time.

The A horizon has dry color of 10YR 3/1, 4/1, 4/2,

or 5/2. Moist color is 10YR 2/1 or 3/1 or N 2/0. The texture in the lower part of the A horizon is silt loam or silty clay loam. The content of clay ranges from 18 to 30 percent. Reaction is slightly acid or neutral.

The C horizon has dry color of 10YR 7/2 or 6/2. Moist color is 10YR 4/2 or 3/2. The texture is stratified sandy clay loam and silty clay loam in the upper part and very gravelly sandy clay loam in the lower part. The content of clay ranges from 20 to 30 percent. The content of rock fragments, mostly gravel, ranges from 35 to 60 percent. Reaction is neutral or slightly alkaline.

Etsel Series

The Etsel series consists of very shallow or shallow, somewhat excessively drained soils that formed in colluvium from shale. These soils are on shoulders and ridges of mountains. Slopes range from 50 to 75 percent. The mean annual precipitation is 40 to 50 inches, and the mean annual temperature is 45 to 47 degrees F.

Taxonomic classification: Loamy-skeletal, mixed, active, nonacid, mesic Lithic Xerorthents

Typical Pedon

Etsel very gravelly sandy loam, in an area of Etsel-Neuns complex, 50 to 75 percent slopes, about 4.5 miles northwest of McCloud, 50 yards north of the Shasta Springs road above a rock outcrop; 600 feet east and 320 feet south of the northwest corner of sec. 5, T. 39 N., R. 3 W., Shasta SW (McCloud) quadrangle (7.5 minute series):

A1—0 to 2 inches; yellowish brown (10YR 5/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak thin platy structure parting to weak very fine granular; soft, very friable, nonsticky and nonplastic; many very fine roots; common very fine interstitial pores; 45 percent gravel; moderately acid (pH 5.8); abrupt smooth boundary.

A2—2 to 5 inches; pale brown (10YR 6/3) very gravelly sandy loam, dark brown (10YR 4/3) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine roots; common very fine interstitial pores; 45 percent gravel; moderately acid (pH 5.8); gradual smooth boundary.

A3—5 to 9 inches; pale brown (10YR 6/3) very gravelly sandy loam, dark brown (10YR 4/3) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine interstitial pores; 55 percent gravel; moderately acid (pH 5.8); abrupt smooth boundary.

R—9 inches; fractured shale.

The depth to bedrock ranges from 6 to 14 inches. Reaction is slightly acid or moderately acid.

The A horizon has dry color of 10YR 5/2, 5/3, 5/4, 6/2, 6/3, 6/4, 7/2, or 7/4 or 7.5YR 4/2, 4/3, 5/2, 5/4, 6/2, 6/3, 6/4, or 7/4. Moist color is 10YR 2/2, 3/2, 3/3, 3/4, 4/2, 4/3, or 4/4 or 7.5YR 3/4, 4/2, 4/3, 4/4, or 4/6. The texture is the gravelly or very gravelly analogs of loam or sandy loam. Some pedons have a thin C horizon. This horizon has colors similar to those of the A horizon. It is very gravelly sandy loam or very gravelly loam.

Fiddler Series

The Fiddler series consists of moderately deep, well drained soils that formed in colluvium from extrusive igneous rock. These soils are on hills. Slopes range from 2 to 50 percent. The mean annual precipitation is 14 to 18 inches, and the mean annual temperature is 45 to 48 degrees.

Taxonomic classification: Clayey-skeletal, smectitic, mesic Typic Argixerolls

Typical Pedon

Fiddler very cobbly loam, in an area of Fiddler-Deven complex, 15 to 30 percent slopes, about 8.4 miles southeast of Canby; 1,900 feet south and 1,000 feet east of the northwest corner of sec. 30, T. 41 N., R. 11 E., Canby SE SW (Hermit Butte) quadrangle (7.5 minute series):

A—0 to 5 inches; dark grayish brown (10YR 4/2) very cobbly loam, very dark brown (10YR 2/2) moist; moderate fine subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; common very fine and few fine roots; few very fine tubular and common fine interstitial pores; 15 percent gravel, 30 percent cobbles, 10 percent stones; neutral (pH 7.0); abrupt smooth boundary.

Bt1—5 to 9 inches; brown (10YR 4/3) very cobbly clay loam, dark brown (7.5YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; common very fine tubular pores; 20 percent gravel and 30 percent cobbles; neutral (pH 7.0); abrupt smooth boundary.

Bt2—9 to 19 inches; brown (7.5YR 4/2) very cobbly clay, brown (7.5YR 4/4) moist; moderate medium angular blocky structure; hard, firm, sticky and

plastic; few medium and coarse and common fine roots; many very fine tubular pores; many moderately thick clay films on peds and in pores; 20 percent gravel and 30 percent cobbles; neutral (pH 7.0); clear smooth boundary.

Bt3—19 to 31 inches; brown (7.5YR 5/4) very cobbly clay, brown (7.5YR 4/4) moist; moderate medium angular blocky structure; hard, very firm, sticky and plastic; few medium and coarse and common fine roots; many very fine tubular pores; many moderately thick clay films on peds and in pores; 20 percent gravel and 25 percent cobbles; neutral (pH 7.0); clear smooth boundary.

R—31 inches; basalt.

The depth to lithic contact ranges from 20 to 40 inches. The content of rock fragments on the surface, mostly cobbles, ranges from 35 to 60 percent. The content of organic matter ranges from 2 to 3 percent to a depth of 19 inches.

The A horizon has dry color of 10YR 4/2, 5/2, or 5/3. Moist color is 10YR 2/2 or 3/2. The content of clay ranges from 18 to 27 percent. The content of rock fragments, mostly cobbles and gravel, ranges from 15 to 35 percent.

The Bt horizon has dry color of 10YR 4/3 or 5/2 or 7.5YR 4/2, 4/4, or 5/4. Moist color is 10YR 3/3 or 7.5YR 3/2 or 4/4. The texture is very cobbly clay loam or very cobbly clay. The content of clay ranges from 35 to 50 percent. The content of rock fragments, mostly cobbles and gravel, ranges from 35 to 55 percent.

Fleener Series

The Fleener series consists of very deep, well drained soils that formed in tephra. These soils are on lava flow plateaus and hills. Slopes range from 2 to 30 percent. The mean annual precipitation is 16 to 25 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Loamy-skeletal, mixed, superactive, mesic Andic Argixerolls

Typical Pedon

Fleener sandy loam, in an area of Loveness-Fleener complex, 2 to 15 percent slopes, about 20 miles north of Lookout on Lookout-Hackmore Road, 7.1 miles southwest on Loveness Road, 50 feet north of the road; 1,500 feet west and 1,500 feet south of the northeast corner of sec. 9, T. 41 N., R. 6 E., Whitehorse NE (Hollenbeck) quadrangle (7.5 minute series):

Oi—1 inch to 0; recent and partially decomposed pine needles and twigs.

A1—0 to 4 inches; reddish brown (5YR 4/4) sandy loam, dark reddish brown (5YR 3/3) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; common fine tubular pores; 10 percent gravel; slightly acid (pH 6.5); abrupt smooth boundary.

A2—4 to 10 inches; reddish brown (5YR 4/4) gravelly sandy loam, dark reddish brown (5YR 3/3) moist; moderate fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and few medium roots; common very fine tubular pores; 30 percent gravel; slightly acid (pH 6.5); clear smooth boundary.

2Bt1—10 to 20 inches; reddish brown (5YR 4/4) very gravelly sandy loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and medium roots and few coarse roots; common very fine tubular pores; common thin clay films in pores; 35 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); clear smooth boundary.

2Bt2—20 to 28 inches; reddish brown (5YR 4/4) very gravelly sandy clay loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine and medium and few coarse roots; common very fine tubular pores; common thin clay films in pores; 50 percent gravel; slightly acid (pH 6.5); gradual smooth boundary.

3Bt3—28 to 40 inches; reddish brown (5YR 5/4) extremely stony sandy clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few medium roots; few very fine tubular pores; common thin clay films in pores; 35 percent gravel and 30 percent stones; slightly acid (pH 6.5); gradual smooth boundary.

3Bt4—40 to 60 inches; reddish brown (5YR 5/4) extremely stony clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few medium roots; common very fine tubular pores; common thin clay films in pores; 25 percent gravel and 40 percent stones; slightly acid (pH 6.5).

The depth to bedrock is more than 60 inches. The depth to stones or boulders ranges from 25 to 40 inches. The particle-size control section (10 to 30

inches) averages 18 to 27 percent clay and 40 to 50 percent rock fragments. The content of rock fragments on the surface, mostly gravel, ranges from 5 to 15 percent. The content of organic matter ranges from 1 to 5 percent to a depth of 10 inches. Base saturation ranges from 50 to 65 percent to a depth of 30 inches. Reaction is slightly acid or neutral.

The A1 horizon has dry color of 5YR 4/4 or 7.5YR 4/2, 4/4, or 5/4. Moist color is 5YR 3/2 or 3/3 or 7.5YR 3/2. The content of rock fragments, mostly gravel, ranges from 5 to 10 percent. NaF pH ranges from 8.8 to 9.6. Bulk density ranges from 0.8 to 0.9 g/cc. The content of glass ranges from 5 to 11 percent. Aluminum plus $^1/_2$ iron is 1.0 to 1.5.

The A2 horizon has dry color of 5YR 4/4 or 5/4 or 7.5YR 4/4. Moist color is 5YR 3/2 or 3/3. The content of organic matter ranges from 1 to 3 percent. The texture is gravelly sandy loam or gravelly loam. The content of rock fragments, mostly gravel, ranges from 15 to 30 percent. NaF pH ranges from 8.6 to 9.0. Bulk density ranges from 0.9 to 0.95 g/cc. The content of glass ranges from 5 to 10 percent. Aluminum plus $^1/_2$ iron is 1.0 to 1.5.

The 2Bt horizon has dry color of 5YR 4/4 or 5/4 or 7.5YR 4/4. Moist color is 5YR 3/4 or 4/4 or 7.5YR 4/4. The content of organic matter is 1 to 2 percent. The texture is sandy loam, sandy clay loam, loam, or clay loam. The content of clay ranges from 15 to 35 percent. The content of rock fragments, mostly gravel, ranges from 35 to 60 percent. NaF pH ranges from 8.6 to 9.0. Clay content decreases by more than 20 percent from the maximum within a depth of 80 inches.

The 3Bt horizon is sandy clay loam or clay loam. The content of clay ranges from 20 to 35 percent. The content of stones and boulders ranges from 40 to 65 percent. The content of gravel ranges from 35 to 45 percent.

Gardens Series

The Gardens series consists of very deep, poorly drained soils that formed in alluvium derived from mixed extrusive igneous rock. These soils are in basins. Slopes range from 0 to 2 percent. The mean annual precipitation is 35 to 50 inches, and the mean annual temperature is 39 to 41 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, frigid Udollic Endoaqualfs

Typical Pedon

Gardens loam, in an area of Gardens-Jacksback complex, 0 to 2 percent slopes, about 9.9 miles southwest of Burney; 1,300 feet west and 350 feet north of the southeast corner of sec. 1, T. 33 N., R. 2 E., Manzanita Lake NW (Jacks Backbone) quadrangle (7.5 minute series):

A—0 to 3 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; common fine distinct strong brown (7.5YR 5/6) iron accumulations, strong brown (7.5YR 4/6) moist; strong thick platy structure parting to moderate fine subangular blocky; slightly hard, friable, nonsticky and slightly plastic; common very fine and few fine roots; many very fine interstitial pores; slightly acid (pH 6.1); abrupt smooth boundary.

Bt1—3 to 7 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; common fine distinct yellowish red (5YR 5/6) iron accumulations, yellowish red (5YR 5/6) moist; moderate fine subangular blocky structure; very hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; few very fine tubular pores; few thin clay films on faces of peds; slightly acid (pH 6.4); clear smooth boundary.

Bt2—7 to 12 inches; pale brown (10YR 6/3) sandy clay loam, dark yellowish brown (10YR 4/4) moist; common medium faint brown (10YR 5/3) iron accumulations, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; few very fine tubular pores; common thin clay films on faces of peds and few moderately thick clay films in pores; slightly acid (pH 6.4); abrupt smooth boundary.

Bt3—12 to 15 inches; pale brown (10YR 6/3) sandy clay loam, dark yellowish brown (10YR 4/4) moist; few fine distinct brown (7.5YR 5/4) iron accumulations; common fine faint brown (7.5YR 5/4) iron accumulations, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine tubular pores; common thin clay films in pores and on faces of peds; 10 percent gravel; neutral (pH 6.6); abrupt smooth boundary.

Bq1—15 to 22 inches; very pale brown (10YR 7/3) sandy clay loam, strong brown (7.5YR 5/6) and brown (10YR 5/3) moist; common medium faint pale yellow (2.5Y 7/4), prominent black (10YR 2/1), and distinct pink (7.5YR 7/4 moist) iron accumulations and depletions; weak fine subangular blocky structure; hard and very hard, brittle and very firm, slightly sticky and slightly plastic; few very fine and fine roots; common very fine tubular pores; few thin clay films in pores and on faces of peds; weakly cemented

discontinuous matrix with 20 percent durinodes; 10 percent gravel; neutral (pH 6.8); clear smooth boundary.

Bq2—22 to 25 inches; very pale brown (10YR 7/3) sandy clay loam, yellowish brown (10YR 5/4) moist; common fine distinct light yellowish brown (2.5Y 6/4) and brown (7.5YR 5/4), few fine distinct light olive brown (2.5Y 5/4), and common medium distinct yellowish red (5YR 5/6) iron accumulations, black (10YR 2/1) moist; moderate thin platy structure parting to moderate fine subangular blocky; hard and very hard, firm, slightly sticky and slightly plastic; few fine roots; few very fine tubular pores; weak cementation; iron and manganese segregation; neutral (pH 7.0); abrupt smooth boundary.

Bq3—25 to 30 inches; light gray (10YR 7/1) sandy loam, gray (10YR 6/1) moist; common coarse prominent brown (7.5YR 4/2) and light yellowish brown (2.5Y 6/4) iron accumulations; many coarse prominent dark reddish brown (5YR 3/2 moist) and dark grayish brown (2.5Y 4/2 moist) iron accumulations; weak fine subangular blocky structure; hard, firm, nonsticky and nonplastic; few fine roots; few very fine tubular pores; weak discontinuous cementation; manganese and iron segregation; neutral (pH 7.0); abrupt smooth boundary.

Bw—30 to 33 inches; light brownish gray (10YR 6/2) and brown (7.5YR 5/4) very gravelly sandy loam, dark grayish brown (10YR 4/2) and brown (7.5YR 4/4) moist; common medium distinct light yellowish brown (2.5Y 6/4) iron accumulations; common medium distinct olive brown (2.5Y 4/4 moist) iron accumulations; weak fine subangular blocky structure; hard, firm, nonsticky and nonplastic; few fine roots; few very fine tubular pores; 40 percent gravel; neutral (pH 7.0); abrupt smooth boundary.

2Bq1—33 to 42 inches; light gray (10YR 7/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; few fine faint very dark grayish brown (10YR 3/2) iron accumulations, brown (7.5YR 4/4) moist; weak thin platy structure parting to weak fine subangular blocky; hard, firm, nonsticky and nonplastic; few fine roots; few very fine tubular pores; weakly cemented by manganese and silica; neutral (pH 7.0); abrupt smooth boundary.

2Bq2—42 to 45 inches; very pale brown (10YR 7/3) sandy clay loam, yellowish brown (10YR 5/4) moist; few fine faint very dark grayish brown (10YR 3/2) iron accumulations, brown (7.5YR 4/4) moist; massive; slightly hard, friable, nonsticky and slightly plastic; few very fine tubular pores; weakly cemented by manganese and silica; neutral (pH 7.0); gradual smooth boundary.

2C—45 to 62 inches; very pale brown (10YR 7/3) fine sandy loam, yellowish brown (10YR 5/4) moist; few fine faint dark grayish brown (10YR 4/2) and brown (7.5YR 5/4) iron accumulations; few fine faint very dark grayish brown (10YR 3/2 moist) and brown (7.5YR 4/4 moist) iron accumulations; massive; slightly hard, friable, nonsticky and nonplastic; few very fine tubular pores; neutral (pH 7.0).

The thickness of the solum ranges from 40 to 60 inches. The particle-size control section (3 to 23 inches) averages 27 to 30 percent clay and 0 to 10 percent rock fragments.

The A horizon has dry color of 10YR 5/2, 6/2, or 7/2. Moist color is 10YR 3/1, 3/2, or 4/2. The content of organic matter ranges from 2 to 3 percent. The content of clay ranges from 18 to 27 percent.

The Bt horizon has dry color of 10YR 5/2 or 5/3 in the upper part and 10YR 6/2, 6/3, 7/2, or 7/3 or 7.5YR 5/4 in the lower part. Moist color is 10YR 3/2 or 3/3 in the upper part and 10YR 4/3 or 4/4 or 7.5YR 3/4 or 4/6 in the lower part. The content of organic matter is 0.5 to 1.0 percent. The texture is clay loam or sandy clay loam. The content of clay ranges from 28 to 35 percent. The content of rock fragments, mostly gravel, ranges from 0 to 15 percent. Reaction is moderately acid or slightly acid.

The Bq and Btq horizons have dry color of 10YR 7/1, 7/2, or 7/3. Moist color is 10YR 5/3, 5/4, or 6/1 or 7.5YR 4/6 or 5/6. The content of organic matter is 0.2 to 0.5 percent. The texture is sandy clay loam in the upper part and sandy loam in the lower part. The content of clay ranges from 18 to 27 percent. The content of rock fragments, mostly gravel, ranges from 0 to 10 percent.

The Bw horizon has dry color of 7.5YR 5/4 or 6/4. Moist color is 7.5YR 4/4 or 5/4. The content of organic matter is 0.2 to 0.5 percent. The content of clay ranges from 15 to 18 percent. The content of rock fragments, mostly gravel, ranges from 35 to 60 percent.

The 2Bq horizon has dry color of 10YR 7/2 or 7/3. Moist color is 10YR 4/2 or 5/4. The content of organic matter is 0.2 to 0.5 percent. The texture is sandy clay loam or fine sandy loam. The content of clay ranges from 15 to 30 percent. The content of rock fragments, mostly gravel, ranges from 0 to 10 percent.

The C horizon has dry color of 10YR 6/4 or 7/3. Moist color is 10YR 4/3, 4/4, or 5/4 or 7.5YR 4/4. The

content of organic matter is 0.2 to 0.5 percent. The content of clay ranges from 15 to 18 percent. The content of rock fragments, mostly gravel, ranges from 0 to 10 percent.

Gasper Series

The Gasper series consists of very deep, well drained soils that formed in tephra. These soils are on lava plateaus and hills. Slopes range from 2 to 50 percent. The mean annual precipitation is 25 to 50 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Loamy-skeletal, mixed, superactive, mesic Andic Haploxeralfs

Typical Pedon

Gasper gravelly sandy loam, in an area of Scarface-Gasper complex, 2 to 15 percent slopes, approximately 8.5 miles northwest of Day, about 20 feet north of K-tag; 1,300 feet east and 250 feet south of the northwest corner of sec. 9, T. 40 N., R. 5 E., Whitehorse SW (Whitehorse) quadrangle (7.5 minute series):

A—0 to 4 inches; brown (7.5YR 4/4) gravelly sandy loam, dark brown (7.5YR 3/4) moist; moderate fine granular structure; soft, loose, nonsticky and slightly plastic; many very fine roots; many very fine interstitial pores; 20 percent gravel and 10 percent cobbles; slightly acid (pH 6.4); clear smooth boundary.

Bt1—4 to 16 inches; reddish brown (5YR 5/4) gravelly sandy loam, dark reddish brown (5YR 3/4) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine and fine and few medium and coarse roots; few thin clay films in pores; 20 percent gravel and 10 percent cobbles; moderately acid (pH 6.0); clear wavy boundary.

2Bt2—16 to 24 inches; light reddish brown (5YR 6/4) very cobbly sandy loam, dark reddish brown (5YR 3/4) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine and fine and few medium roots; common very fine tubular pores; few thin clay films in pores; 10 percent gravel, 30 percent cobbles, 10 percent stones; slightly acid (pH 6.2); clear wavy boundary.

2Bt3—24 to 38 inches; light reddish brown (5YR 6/4) extremely stony sandy loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few very fine and fine and common medium roots; few very fine tubular pores; few thin clay films in pores; 50 percent stones, 10 percent cobbles, 10 percent gravel; slightly acid (pH 6.2); gradual wavy boundary.

2Bt4—38 to 50 inches; light reddish brown (5YR 6/4) very cobbly sandy clay loam, reddish brown (5YR 4/4) moist; moderate fine angular blocky structure; slightly hard, friable, slightly sticky and plastic; few fine and medium roots; few very fine tubular pores; common thin clay films in pores; 10 percent gravel and 30 percent cobbles; moderately acid (pH 6.0); gradual wavy boundary.

2Bt5—50 to 61 inches; light brown (7.5YR 6/4) very cobbly sandy clay loam, brown (7.5YR 4/4) moist; moderate fine angular blocky structure; slightly hard, friable, slightly sticky and plastic; few fine and medium roots; few very fine tubular pores; many thin clay films in pores; NaF pH 8.8; 10 percent gravel and 30 percent cobbles; neutral (pH 7.0).

The depth to bedrock is more than 60 inches. The particle-size control section (4 to 24 inches) averages 15 to 20 percent clay and 35 to 50 percent rock fragments, mostly gravel. The content of organic matter ranges from 1 to 6 percent to a depth of 16 inches. Base saturation ranges from 30 to 45 by sum of cations throughout.

The A horizon has dry color of 7.5YR 4/4 or 5/4 or 5YR 4/4 or 5/4. Moist color is 7.5YR 3/3 or 3/4 or 5YR 3/3 or 3/4. The content of gravel ranges from 10 to 20 percent, and the content of cobbles ranges from 5 to 10 percent. Reaction is slightly acid or moderately acid. NaF pH is 10.5 to 12.0. Moist bulk density is 0.8 to 0.9 g/cc.

The Bt horizon has moist bulk density of 0.9 to 1.0 g/cc.

The 2Bt horizon has dry color of 7.5YR or 5YR 4/4, 5/4, or 6/4. Moist color is 5YR 3/4 or 7.5YR 3/4 or 4/4. The texture is sandy loam or sandy clay loam. The content of clay ranges from 8 to 25 percent. The content of gravel ranges from 10 to 20 percent, the content of cobbles ranges from 10 to 30 percent, and the content of stones ranges from 0 to 50 percent. Reaction ranges from neutral to moderately acid. NaF pH is 8.8 to 11.0 and increases with depth.

Gassaway Series

The Gassaway series consists of shallow, well drained soils that formed in alluvium and eolian deposits derived from extrusive igneous rocks. These soils are on lava plateaus and lava ridges. Slopes range from 2 to 15 percent. The mean annual

precipitation is 16 to 25 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Loamy, mixed, superactive, mesic Lithic Xerochrepts

Typical Pedon

Gassaway cobbly loam, in an area of Lava flows-Gassaway complex, 2 to 15 percent slopes, about 2.3 miles northeast of Dana, 0.1 mile north of Horrs Four Corners on Spring Creek Road; 200 feet south and 260 feet east of the northwest corner of sec. 21, T. 38 N., R. 4 E., Pondosa SE (Dana) quadrangle (7.5 minute series):

A—0 to 3 inches; brown (7.5YR 5/4) cobbly loam, brown (7.5YR 4/4) moist; weak very fine subangular blocky structure; slightly hard, very friable, nonsticky and slightly plastic; common very fine roots; few fine vesicular and common fine tubular pores; 20 percent cobbles and 10 percent gravel; neutral (pH 6.8); abrupt smooth boundary.

Bw1—3 to 7 inches; brown (7.5YR 5/4) loam, brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; hard, friable, nonsticky and slightly plastic; few medium and common very fine roots; common very fine tubular pores; 10 percent gravel; neutral (pH 6.8); clear smooth boundary.

Bw2—7 to 12 inches; brown (7.5YR 5/4) loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, nonsticky and slightly plastic; few fine and common medium and coarse roots; common very fine tubular pores; 10 percent gravel; neutral (pH 6.8); abrupt smooth boundary.

2R—12 inches; hard basalt.

The depth to lithic contact ranges from 11 to 14 inches. The content of rock fragments on the surface, mostly cobbles and gravel, ranges from 15 to 35 percent. Reaction is slightly acid or neutral. Base saturation by ammonium acetate ranges from 62 to 65 percent.

The A horizon has dry color of 10YR 5/4 or 6/4 or 7.5YR 4/4 or 5/4. Moist color is 5YR 3/4 or 7.5YR 4/4. The content of rock fragments, mostly cobbles and gravel, ranges from 15 to 35 percent. The content of organic matter ranges from 1 to 3 percent.

The Bw horizon has dry color of 7.5YR 4/4, 4/6, or 5/4. Moist color is 5YR 4/4 or 7.5YR 4/4. The texture is loam or gravelly loam. The content of clay ranges from 15 to 18 percent. The content of rock fragments, mostly gravel, ranges from 10 to 30 percent. The content of organic matter is 0.5 to 1.0 percent.

Gooval Series

The Gooval series consists of moderately deep, moderately well drained soils that formed in tephra over basalt. These soils are on lava plateaus. Slopes range from 2 to 9 percent. The mean annual precipitation is 16 to 25 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Clayey-skeletal, mixed, superactive, mesic Ultic Argixerolls

Typical Pedon

Gooval cobbly loam, 2 to 9 percent slopes, about 2.5 miles northwest of Burney; 500 feet north and 1,800 feet east of the southwest corner of sec. 6, T. 35 N., R. 3 E., Burney NW (Burney) quadrangle (7.5 minute series):

A—0 to 8 inches; brown (7.5YR 5/4) cobbly loam, dark brown (7.5YR 3/2) moist; moderate medium granular structure; slightly hard, friable, nonsticky and slightly plastic; many very fine and fine roots; many very fine interstitial pores; 10 percent gravel, 10 percent cobbles; moderately acid (pH 6.0); clear smooth boundary.

Bt1—8 to 14 inches; reddish brown (5YR 5/4) very cobbly clay loam, dark reddish brown (5YR 3/4) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; common fine and medium roots; common very fine and fine tubular pores; common moderately thick clay films on faces of peds and lining pores; 20 percent gravel, 15 percent cobbles; moderately acid (pH 6.0); gradual smooth boundary.

Bt2—14 to 23 inches; reddish brown (5YR 5/3) very cobbly clay, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; very hard, firm, very sticky and very plastic; few very fine and fine roots; common very fine and fine tubular pores; many moderately thick clay films; 20 percent gravel, 20 percent cobbles, 5 percent stones; moderately acid (pH 6.0); clear wavy boundary.

2Crt—23 inches; weathered fractured basalt; fractures filled with clay.

The depth to paralithic contact ranges from 20 to 40 inches. The thickness of the mollic epipedon ranges from 8 to 12 inches. The content of rock fragments on the surface, mostly cobbles, ranges from 5 to 20 percent. NaF pH is 9 or less. Base saturation by sum of cations ranges from 50 to 75 percent.

The A horizon has dry color of 10YR 5/2 or 5/3 or 7.5YR 5/4. Moist color is 10YR 2/2, 3/2, or 3/3 or

7.5YR 3/2. The content of organic matter ranges from 2 to 6 percent. The content of rock fragments, mostly cobbles or gravel, ranges from 15 to 35 percent. Reaction is moderately acid or slightly acid.

The Bt horizon has dry color of 10YR 5/2 or 5/3; 7.5YR 4/4 or 5/4; or 5YR 4/3, 5/3, or 5/4. Moist color is 10YR 3/3 or 4/3, 7.5YR 3/4 or 4/2, or 5YR 3/3 or 3/4. The content of organic matter ranges from 0.5 to 2.0 percent. The texture is very cobbly or very gravelly clay loam or clay. The content of clay ranges from 27 to 55 percent and averages 35 to 50 percent in the particle-size control section. The content of rock fragments, mostly cobbles or gravel, ranges from 35 to 50 percent. Reaction ranges from moderately acid to neutral.

Gosch Series

The Gosch series consists of deep, well drained soils that formed in tephra. These soils are on mountains. Slopes range from 2 to 50 percent. The mean annual precipitation is 18 to 20 inches, and the mean annual temperature is 40 to 45 degrees F.

Taxonomic classification: Loamy-skeletal, mixed, superactive, frigid Andic Haploxeralfs

Typical Pedon

Gosch gravelly sandy loam, in an area of Witcher-Gosch complex, 2 to 15 percent slopes, about 17.5 miles southwest of Alturas; 1,350 feet west and 300 feet north of the southeast corner of sec. 19, T. 40 N., R. 11 E., Alturas SW (Graven Ridge) quadrangle (7.5 minute series):

Oi—1 inch to 0; recent and decomposed pine and fir litter.

A—0 to 3 inches; brown (10YR 4/3) gravelly sandy loam, dark brown (7.5YR 3/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; 20 percent gravel; slightly acid (pH 6.5); abrupt smooth boundary.

AB—3 to 9 inches; brown (7.5YR 5/4) extremely stony sandy loam, dark reddish brown (5YR 3/3) moist; moderate fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many fine and common medium and coarse roots; many very fine interstitial pores; 40 percent stones, 25 percent cobbles, 10 percent gravel; slightly acid (pH 6.5); abrupt wavy boundary.

2Bt1—9 to 22 inches; brown (7.5YR 5/4) extremely stony sandy clay loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine and common medium and coarse roots; common very fine tubular pores; few thin clay films in pores; 40 percent stones, 30 percent cobbles, 15 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

2Bt2—22 to 32 inches; brown (7.5YR 5/4) extremely stony clay loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; slightly sticky and slightly plastic; common medium and coarse and few fine roots; common very fine tubular pores; few thin clay films; 40 percent stones, 30 percent cobbles, 15 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

2Bt3—32 to 50 inches; brown (7.5YR 5/4) extremely gravelly clay loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few medium roots; common very fine tubular pores; common thin clay films in pores; 70 percent weathered gravel; moderately acid (pH 6.0); gradual wavy boundary.

2Cr—50 inches; soft, weathered andesite.

The depth to paralithic contact ranges from 40 to 60 inches. The particle-size control section averages 27 to 30 percent clay and 35 to 50 percent rock fragments, mostly stones and cobbles. NaF pH is 10.0 to 9.6. Base saturation by sum of cations ranges from 50 to 60 percent. The content of organic matter ranges from 2.2 to 4.7 percent to a depth of 9 inches. Reaction is slightly acid or moderately acid.

The A horizon has dry color of 10YR 4/3 or 4/2. Moist color is 7.5YR 3/2 or 5YR 3/2. The texture is gravelly sandy loam or very stony sandy loam. The content of rock fragments, mostly gravel or stones, ranges from 15 to 60 percent. Bulk density is assumed to be less than 1.0 g/cc. Aluminum and $^1/_2$ iron is assumed to range from 1.0 to 1.5.

The AB horizon has dry color of 7.5YR 5/4 or 10YR 4/4. Moist color is 5YR 3/3 or 3/4 or 7.5YR 3/4. The texture is very stony sandy loam or extremely stony sandy loam. The content of clay ranges from 15 to 18 percent. The content of rock fragments, mostly stones, ranges from 35 to 80 percent. Bulk density is assumed to be less than 1.0 g/cc. Aluminum and $^1/_2$ iron is assumed to range from 1.0 to 1.5.

The 2Bt1 and 2Bt2 horizons have dry color of 7.5YR 5/4, 4/4, or 4/6. Moist color is 5YR 3/4 or 3/6 or 7.5YR 3/4. The texture is extremely stony sandy clay loam, extremely stony clay loam, or very cobbly

sandy clay loam. The content of clay ranges from 20 to 35 percent. The content of rock fragments, mostly stones or cobbles, ranges from 35 to 90 percent.

The 2Bt3 horizon has dry color of 7.5YR 4/6 or 5/4. Moist color is 5YR 3/4 or 3/6 or 7.5YR 3/4. The texture is extremely gravelly clay loam or extremely cobbly sandy clay loam. The content of clay ranges from 27 to 35 percent. The content of rock fragments, mostly gravel or cobbles, ranges from 60 to 90 percent.

Goulder Series

The Goulder series consists of very deep, well drained soils that formed in tephra over andesitic lava. These soils are on lava plateaus and mountains. Slopes range from 2 to 50 percent. The mean annual precipitation is 30 to 50 inches, and the mean annual temperature is 39 to 44 degrees F.

Taxonomic classification: Medial over loamy-skeletal, mixed, superactive, frigid Ultic Haploxerands

Typical Pedon

Goulder gravelly sandy loam, 2 to 15 percent slopes, about 9 miles west of Dana; 2,600 feet south and 2,300 feet west of the northeast corner of sec. 21, T. 38 N., R. 2 E., Pondosa SW (Burney Falls) quadrangle (7.5 minute series):

Oi—1 inch to 0; leaves, needles, and twigs in various stages of decomposition.

A1—0 to 7 inches; brown (7.5YR 5/4) gravelly sandy loam, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure parting to moderate fine granular; soft, very friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; many very fine and fine interstitial pores; 15 percent gravel and 5 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

A2—7 to 17 inches; brown (7.5YR 5/4) cobbly sandy loam, dark brown (7.5YR 3/4) moist; weak fine and medium subangular blocky structure parting to moderate fine granular; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; many very fine and fine and few medium interstitial pores; 14 percent gravel and 20 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

2AB—17 to 27 inches; brown (7.5YR 5/4) cobbly loam, dark brown (7.5YR 4/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine and common medium and coarse roots; many very fine and fine interstitial pores; 14 percent gravel and 20 percent cobbles; moderately acid (pH 5.8); gradual irregular boundary.

2Bt1—27 to 41 inches; brown (7.5YR 5/4) very cobbly clay loam, dark brown (7.5YR 4/4) moist; moderate fine and medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few fine and common medium roots; common very fine and fine interstitial and few fine tubular pores; few thin clay films on faces of peds; 15 percent gravel, 20 percent cobbles, 15 percent stones; strongly acid (pH 5.5); gradual irregular boundary.

2Bt2—41 to 58 inches; brown (7.5YR 5/4) very gravelly clay loam, dark brown (7.5YR 4/4) moist; moderate medium and coarse subangular blocky structure; slightly hard, firm, sticky and slightly plastic; few fine, medium, and coarse roots; common very fine and fine interstitial and few fine tubular pores; common moderately thick clay films on faces of peds and few thick clay films in pores; 20 percent gravel, 10 percent cobbles, 10 percent stones; strongly acid (pH 5.5); gradual wavy boundary.

2Bt3—58 to 64 inches; brown (7.5YR 5/4) very bouldery clay loam, dark brown (7.5YR 4/4) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, sticky and slightly plastic; few fine, medium, and coarse roots; common very fine and fine interstitial and few fine tubular pores; few moderately thick clay films on faces of peds and in pores; 50 percent boulders; strongly acid (pH 5.2).

The thickness of the solum and the depth to bedrock are more than 60 inches. The content of rock fragments on the surface, mostly gravel, ranges from 5 to 15 percent. The mineralogy is dominated by allophane and imogolite.

The A horizon has dry color of 10YR 3/3 or 5/3, 7.5YR 4/4 or 5/4, or 5YR 4/4. Moist color is 10YR 3/2 or 2/2; 7.5YR 3/4 or 3/2; or 5YR 3/2, 3/3, or 3/4. The content of rock fragments, mostly cobbles or gravel, ranges from 15 to 35 percent. Reaction is slightly acid or neutral and decreases with depth. Base saturation by sum of cations ranges from 15 to 30 percent. Bulk density ranges from 0.6 to 0.9 g/cc. Aluminum plus $^1/_2$ iron ranges from 4.0 to 5.5 percent.

The 2Bt horizon has dry color of 7.5YR 5/4, 6/4, or 7/4 or 5YR 5/4. Moist color is 7.5YR 4/4 or 5YR 3/4, 4/3, or 4/4. The texture is very gravelly sandy clay loam, very cobbly sandy clay loam, very gravelly clay loam, extremely gravelly clay loam, very cobbly clay loam, or very bouldery clay loam. The content of clay ranges from 27 to 35 percent. The content of rock fragments ranges from 35 to 80 percent in the

lower part. Reaction ranges from strongly acid to slightly acid. Base saturation by sum of cations ranges from 15 to 31 percent.

Graven Series

The Graven series consists of moderately deep, moderately well drained soils that formed in alluvium derived from extrusive igneous rock. These soils are on stream terraces. Slopes range from 2 to 5 percent. The mean annual precipitation is 16 to 20 inches, and the mean annual temperature is 50 to 52 degrees F.

Taxonomic classification: Fine, smectitic, mesic Typic Durixerolls

Typical Pedon

Graven silt loam (fig. 13), in an area of Dudgen-Graven complex, 0 to 5 percent slopes, about 1.2 miles northwest of Fall River Mills; 50 feet west and 530 feet south of the northeast corner of sec. 25, T. 37 N., R. 4 E., Fall River Mills SW (Fall River Mills) quadrangle (7.5 minute series):

A1—0 to 3 inches; grayish brown (10YR 5/2) silt loam, dark brown (7.5YR 3/2) moist; strong medium platy structure parting to weak fine subangular blocky; very hard, friable, nonsticky and slightly plastic; common very fine roots; common very fine tubular and few vesicular pores; neutral (pH 6.6); abrupt smooth boundary.

A2—3 to 9 inches; grayish brown (10YR 5/2) silt loam, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure; very hard, firm, nonsticky and slightly plastic; common very fine and fine and few medium roots; many very fine tubular pores; neutral (pH 6.7); clear smooth boundary.

Bt1—9 to 14 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine prismatic structure parting to weak fine angular blocky; very hard, firm, slightly sticky and plastic; common very fine and few fine roots; many very fine tubular pores; common thin clay films in pores; neutral (pH 6.9); abrupt smooth boundary.

Bt2—14 to 20 inches; grayish brown (10YR 5/2) clay loam, dark brown (10YR 3/3) moist; strong medium prismatic structure parting to strong medium angular blocky; extremely hard, very firm, sticky and plastic; few very fine roots; many very fine tubular pores; common moderately thick clay films on peds; neutral (pH 7.0); clear smooth boundary.

Bt3—20 to 23 inches; brown (10YR 5/3) clay, dark grayish brown (10YR 4/2) moist; strong fine prismatic structure parting to strong fine angular blocky; extremely hard, very firm, sticky and plastic; few very fine roots; many very fine tubular pores; common moderately thick clay films on peds; slightly alkaline (pH 7.5); abrupt smooth boundary.

2Bqm—23 to 29 inches; indurated duripan; continuous silica-cemented cap 1/8 to 1/4 inch thick; platy structure; brittle; common manganese stains; abrupt smooth boundary.

2Bqk—29 to 35 inches; light brownish gray (10YR 6/2) very fine sandy loam, dark yellowish brown (10YR 4/4) moist; moderate coarse subangular blocky structure; very hard, firm, nonsticky and nonplastic; few very fine roots; common very fine tubular pores; common fine irregular soft masses of lime; weakly cemented with silica; moderately alkaline (pH 8.4); clear smooth boundary.

2Bk—35 to 43 inches; light gray (10YR 7/2) very fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; very hard, friable, nonsticky and nonplastic; few very fine roots; common very fine tubular pores; common fine irregular soft masses of lime; moderately alkaline (pH 8.5); clear smooth boundary.

3C1—43 to 54 inches; light gray (10YR 7/2) loam, dark yellowish brown (10YR 4/4) moist; massive; hard, friable, nonsticky and nonplastic; few very fine roots; common very fine tubular pores; strongly alkaline (pH 8.5); clear smooth boundary.

3C2—54 to 64 inches; light gray (10YR 7/2) very fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; hard, very friable, nonsticky and nonplastic; many very fine tubular pores; moderately alkaline (pH 8.2).

Depth to the duripan ranges from 20 to 40 inches. The depth to unconformable, stratified alluvium ranges from 25 to 52 inches. Base saturation ranges from 75 to 100 percent.

The A1 horizon has dry color of 10YR 5/2, 5/3, or 5/4. Moist color is 10YR 3/2 or 3/3 or 7.5YR 3/2. The content of organic matter is 1 to 2 percent. The content of clay ranges from 15 to 25 percent.

The A2 horizon has dry color of 10YR 5/2 or 5/3. Moist color is 10YR 3/2 or 3/3 or 7.5YR 3/2. The content of organic matter is 1 to 2 percent. The content of clay ranges from 18 to 25 percent.

The Bt horizon has dry color of 10YR 4/3, 5/2, or 5/3 or 7.5YR 4/4. Moist color is 10YR 3/2, 3/3, 4/2, or 4/3; 7.5YR 3/2 or 4/4; or 5YR 3/4 or 4/4. The content of organic matter in the upper part ranges from 0.5 to 1.0 percent and decreases regularly with depth. The upper part of the Bt horizon is silt loam, loam, or clay

loam. The content of clay ranges from 25 to 30 percent. The lower part of this horizon is clay loam or clay. The content of clay ranges from 35 to 50 percent.

The 2Bqkm horizon has a continuous silica cap 1/8 to 1/4 inch thick underlain by 4 to 12 inches of firm or very firm, slightly or moderately brittle material that has platy structure or is massive. Reaction ranges from slightly alkaline to strongly alkaline.

The 2Bqk and 2Bk horizons are stratified loamy sand to silt loam. Reaction ranges from slightly alkaline to strongly alkaline.

Hambone Series

The Hambone series consists of deep, well drained soils that formed in slope alluvium derived from extrusive igneous rock. These soils are on lava plateaus and hills. Slopes range from 5 to 50 percent. The mean annual precipitation is 20 to 30 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Loamy-skeletal, mixed, superactive, mesic Ultic Haploxeralfs

Typical Pedon

Hambone gravelly sandy loam, in an area of Hambone-Boardburn complex, 15 to 30 percent slopes, about 8 miles northwest of Bieber on the east side of the Big Valley Mountains, 100 feet on the north side of a dirt road; 50 feet south and 350 feet east of the northwest corner of sec. 12, T. 39 N., R. 6 E., Bieber NW (Lookout) quadrangle (7.5 minute series):

Oi—2 inches to 0; leaves and twigs.

A1—0 to 2 inches; dark brown (10YR 4/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; strong fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots; common very fine interstitial pores; 5 percent cobbles and 25 percent gravel; neutral (pH 6.6); clear wavy boundary.

A2—2 to 8 inches; brown (7.5YR 5/4) gravelly sandy loam, dark brown (7.5YR 3/4) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; 5 percent cobbles and 25 percent gravel; neutral (pH 6.6); clear wavy boundary.

Bt1—8 to 15 inches; brown (7.5YR 5/4) very gravelly sandy clay loam, dark brown (7.5YR 3/4) moist; strong fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common very fine tubular pores; common thin clay films in pores; 10 percent cobbles and 45 percent gravel; neutral (pH 6.6); clear wavy boundary.

Bt2—15 to 22 inches; brown (7.5YR 5/4) very gravelly sandy clay loam, dark brown (7.5YR 3/4) moist; strong fine angular blocky structure; hard, friable, sticky and plastic; common very fine and few fine roots; common very fine tubular pores; common thin clay films in pores and on peds; 10 percent stones and 45 percent gravel; neutral (pH 6.6); clear wavy boundary.

Bt3—22 to 45 inches; brown (7.5YR 5/4) extremely cobbly sandy clay loam, dark brown (7.5YR 3/4) moist; strong fine angular blocky structure; hard, friable, sticky and plastic; common very fine and few fine and medium roots; common very fine tubular pores; many moderately thick clay films in pores and on peds; 10 percent stones, 20 percent cobbles, 35 percent gravel; slightly acid (pH 6.4); clear wavy boundary.

Cr—45 inches; weathered tuff.

The depth to paralithic contact ranges from 40 to 60 inches. The content of clay ranges from 20 to 35 percent in the particle-size control section. Base saturation ranges from 50 to 70 percent to a depth of 30 inches. Reaction is slightly acid or neutral. About 15 to 30 percent of the surface is covered with gravel or cobbles.

The A horizon has dry color of 10YR 5/4 or 4/3 or 7.5YR 5/4. Moist color is 10YR 3/2 or 3/3, 7.5YR 3/2 or 3/4, or 5YR 3/2 or 3/3. The content of rock fragments, mostly gravel and cobbles, ranges from 15 to 35 percent. NaF pH ranges from 9.0 to 8.5.

The Bt horizon has dry color of 7.5YR 6/4, 5/4, or 4/4. Moist color is 7.5YR 3/4 or 5YR 4/6, 4/4, or 3/4. The texture is very gravelly sandy clay loam, very cobbly sandy clay loam, or extremely cobbly sandy clay loam. The content of rock fragments, mostly subangular and subrounded gravel and cobbles, ranges from 35 to 70 percent. NaF pH ranges from 8.5 to 8.0.

Henhill Series

The Henhill series consists of very deep, somewhat poorly drained soils that formed in lake sediments and alluvium derived from extrusive igneous rock. These soils are on stream terraces. Slopes range from 0 to 2 percent. The mean annual precipitation is 12 to 20 inches, and the mean annual temperature is 48 to 52 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Pachic Argixerolls

Typical Pedon

Henhill silt loam, partially drained, 0 to 2 percent slopes (fig. 14), about 1.6 miles northwest of Fall River Mills, 100 feet northwest of the PG&E intake dam; 50 feet west and 2,300 feet south of the northeast corner of sec. 26, T. 37 N., R. 4 E., Fall River Mills SW (Fall River Mills) quadrangle (7.5 minute series):

A1—0 to 3 inches; dark gray (10YR 4/1) silt loam, very dark gray (10YR 3/1) moist; strong very fine granular structure; slightly hard, very friable, nonsticky and slightly plastic; many very fine roots; many very fine interstitial pores; neutral (pH 7.0); clear smooth boundary.

A2—3 to 12 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; few fine distinct brown (7.5YR 4/4) iron accumulations, brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, very friable, nonsticky and slightly plastic; many very fine and common fine roots; few very fine and common fine tubular pores; slightly alkaline (pH 7.5); clear wavy boundary.

A3—12 to 21 inches; dark gray (10YR 4/1) silt loam, black (N 2/0) moist; common fine distinct brown (7.5YR 4/4 dry and moist) iron accumulations; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; common very fine and fine roots; common fine tubular pores; moderately alkaline (pH 8.0); clear wavy boundary.

Bt1—21 to 31 inches; dark gray (10YR 4/1) silty clay loam, black (N 2/0) moist; common fine distinct dark reddish brown (5YR 3/2) iron accumulations; moderate fine subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; common very fine and few fine roots; common fine tubular pores; common thin clay films on peds and in pores; moderately alkaline (pH 8.0); clear wavy boundary.

Bt2—31 to 41 inches; brown (7.5YR 5/4) silty clay loam, dark brown (7.5YR 3/2) moist; many fine faint dark reddish brown (5YR 3/2) iron accumulations; moderate fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common very fine and few fine roots; common fine tubular pores; many moderately thick clay films on peds and in pores; moderately alkaline (pH 8.0); clear smooth boundary.

Bt3—41 to 46 inches; pinkish gray (7.5YR 6/2) silty clay loam, dark brown (7.5YR 3/2) moist; many fine faint strong brown (7.5YR 4/6) iron accumulations, dark brown (7.5YR 4/2) moist; moderate fine angular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; common fine tubular pores; many moderately thick clay films on peds and in pores; slightly effervescent, disseminated lime; moderately alkaline (pH 8.0); clear smooth boundary.

C—46 to 62 inches; light gray (10YR 7/2) silt loam, dark grayish brown (2.5Y 4/2) moist; many fine distinct strong brown (7.5YR 4/6) iron accumulations, faint dark brown (7.5YR 4/2) moist; moderate coarse subangular blocky structure; hard, firm, nonsticky and slightly plastic; few fine roots; few fine tubular pores; slightly effervescent, disseminated lime; moderately alkaline (pH 8.0).

The depth to stratified alluvial deposits ranges from 40 to more than 60 inches. The thickness of the mollic epipedon ranges from 20 to 31 inches. These soils are saturated at a depth of 20 to 60 inches from November through April because of the seasonal high water table. The particle-size control section ranges from 27 to 35 percent clay. Electrical conductivity ranges from 0 to 2 millimhos per centimeter. Some pedons have an Ak horizon or do not have a Btk horizon.

The A horizon has dry color of 10YR 4/1 or 5/1 or N 5/0; faint or distinct redoximorphic features have dry color of 7.5YR 5/4. Moist color is 10YR 2/1 or 3/1 or N 2/0; faint or distinct redoximorphic features have moist color of 7.5YR 4/4. The content of organic matter ranges from 4 to 7 percent. The content of clay ranges from 18 to 27 percent. Reaction ranges from neutral to moderately alkaline. Base saturation by sum of cations ranges from 90 to 100 percent. This horizon is noneffervescent or slightly effervescent, and lime is disseminated.

The Bt1 and Bt2 horizons have dry color of 10YR 4/1, 5/1, 5/2, 6/1, 6/2, or 7/2 or 7.5YR 5/4 or 6/2; faint to prominent redoximorphic features have dry color of 5YR 3/4, 7.5YR 4/4, or 10YR 4/4. Moist color is 10YR 3/1, 3/2, or 4/2; 7.5YR 3/2 or 4/2; or N 2/0; faint to prominent redoximorphic features have moist color of 5YR 3/2 or 7.5YR 4/4. The content of organic matter ranges from 1 to 4 percent. The content of clay ranges from 27 to 35 percent. Reaction is moderately alkaline or strongly alkaline. Base saturation by sum of cations ranges from 90 to 100 percent. These horizons are noneffervescent or slightly effervescent, and lime is disseminated.

The Bt3 horizon has dry color of 10YR 6/1 or 6/2 or 7.5YR 6/2; faint to prominent redoximorphic features have dry color of 7.5YR 4/6 or 10YR 5/4. Moist color is 10YR 3/1, 3/2, 4/1, or 4/2 or 7.5YR 3/2;

faint to prominent redoximorphic features have moist color of 7.5YR 4/2 or 10YR 4/4. The content of clay ranges from 27 to 35 percent. This horizon ranges from slightly effervescent to violently effervescent, and lime is disseminated.

The C horizon has dry color of 10YR 7/2, 8/1, or 7/1; distinct redoximorphic features have dry color of 7.5YR 4/6. Moist color is 10YR 5/1 or 6/2, 5Y 4/2, or 2.5Y 4/2; distinct redoximorphic features have moist color of 7.5YR 4/2. The texture is silt loam, sandy loam, sandy clay loam, very gravelly sandy loam, or very gravelly sandy clay loam. The content of clay ranges from 15 to 27 percent. The content of rock fragments, mostly gravel, ranges from 0 to 60 percent. This horizon is slightly effervescent and has disseminated lime.

Hermit Series

The Hermit series consists of deep, well drained soils that formed in tephra. These soils are on mountains. Slopes range from 2 to 50 percent. The mean annual precipitation is 20 to 25 inches, and the mean annual temperature is 38 to 43 degrees F.

Taxonomic classification: Medial over loamy, mixed, superactive Xeric Haplocryands

Typical Pedon

Hermit sandy loam, in an area of Hermit-Canyoncreek complex, 2 to 15 percent slopes, about 12 miles southeast of Canby; about 2,400 feet west and 1,500 feet south of the northeast corner of sec. 26, T. 40 N., R. 10 E., Canby SE (Hermit Butte) quadrangle (7.5 minute series):

Oi—2 inches to 0; recent and decomposed fir and pine litter.

A1—0 to 3 inches; brown (10YR 4/3) sandy loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine interstitial pores; 10 percent gravel; moderately acid (pH 6.0); abrupt wavy boundary.

A2—3 to 8 inches; brown (10YR 4/3) sandy loam, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and medium and few very fine roots; common very fine interstitial pores; 10 percent gravel; slightly acid (pH 6.5); clear smooth boundary.

A3—8 to 15 inches; brown (10YR 4/3) sandy loam, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and few medium and coarse roots; few very fine tubular and common very fine interstitial pores; 10 percent gravel; slightly acid (pH 6.5); clear smooth boundary.

2Bw—15 to 26 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common medium and fine and few coarse roots; common very fine tubular pores; 10 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

3Bt—26 to 42 inches; brown (10YR 5/3) very gravelly loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common medium and few fine roots; common very fine tubular pores; few thin clay films on pebbles; 50 percent weathered gravel; NaF pH 9.4; slightly acid (pH 6.5); clear wavy boundary.

3Cr—42 inches; soft, weathered andesite.

The mollic epipedon is 25 to 42 inches thick. The depth to paralithic contact ranges from 40 to 60 inches. Base saturation by ammonium acetate ranges from 50 to 75 percent. Reaction is slightly acid or moderately acid.

The A horizon has dry color of 10YR 4/2, 4/3, or 5/3 or 7.5YR 4/2. Moist color is 10YR 2/2, 3/2, or 3/3 or 7.5YR 3/2. The content of organic matter ranges from 2 to 4 percent. The content of rock fragments, mostly gravel, ranges from 0 to 15 percent. Average 15-bar water is 18 to 21 percent. Bulk density ranges from 0.70 to 0.85 g/cc. The content of glass ranges from 7 to 15 percent. Aluminum plus $^1/_2$ iron by ammonium oxalate is 2.0 or more.

The 2Bw horizon has dry color of 10YR 4/3 or 5/3 or 7.5YR 4/2. Moist color is 10YR 3/2 or 3/3 or 7.5YR 3/2. The content of organic matter ranges from 1 to 3 percent. The content of rock fragments, mostly gravel, ranges from 0 to 15 percent. Bulk density ranges from 1.00 to 1.20 g/cc.

The 3Bt horizon has dry color of 10YR 4/3, 5/3, or 5/2. Moist color is 10YR 3/2 or 3/3 or 7.5YR 3/2. The content of organic matter is 1 to 2 percent. The content of clay ranges from 18 to 27 percent. The content of rock fragments, mostly weathered gravel, ranges from 35 to 60 percent. Bulk density ranges from 1.0 to 1.2 g/cc.

Hunsinger Series

The Hunsinger series consists of deep, well drained soils that formed in colluvium of intermixed tephra and extrusive igneous rock. These soils are on lava plateaus and hills. Slopes range from 2 to 50

percent. The mean annual precipitation is 16 to 25 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Loamy-skeletal, mixed, superactive, mesic Ultic Argixerolls

Typical Pedon

Hunsinger gravelly sandy loam, in an area of Hunsinger-Chirpchatter complex, 2 to 15 percent slopes, about 3.5 miles southwest of Nubieber, 2,200 feet west on dirt road from the intersection of the road to Johns Valley and Mullens Spring and about 100 feet southwest of the dirt road; about 1,850 feet west and 2,375 feet north of the southeast corner of sec. 12, T. 37 N., R. 6 E., Bieber SW (Bieber) quadrangle (7.5 minute series):

A—0 to 3 inches; brown (7.5YR 5/4) gravelly sandy loam, dark reddish brown (5YR 3/3) moist; weak medium platy structure parting to weak fine subangular blocky; soft, very friable, slightly sticky and slightly plastic; many very fine, common fine, and few medium roots; common very fine and fine tubular pores; 20 percent gravel; slightly acid (pH 6.1); clear smooth boundary.

BAt—3 to 13 inches; brown (7.5YR 5/4) gravelly sandy loam, dark reddish brown (5YR 3/3) moist; weak coarse and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine, common fine, and few medium roots; common very fine and fine tubular pores; many thin clay films in bridges between mineral grains and common thin clay films on peds; 15 percent gravel; slightly acid (pH 6.2); clear smooth boundary.

2Bt1—13 to 26 inches; strong brown (7.5YR 4/6) very cobbly sandy clay loam, dark reddish brown (5YR 3/4) moist; moderate coarse and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; common very fine and fine tubular pores; many thin clay films on peds and few moderately thick clay films on peds and in pores; 30 percent subrounded cobbles and 15 percent gravel; slightly acid (pH 6.2); clear smooth boundary.

2Bt2—26 to 42 inches; strong brown (7.5YR 4/6) very cobbly sandy clay loam, reddish brown (5YR 4/4) moist; moderate coarse and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine and few medium roots; common very fine and fine tubular pores; many thin clay films on peds and few moderately thick clay films on peds and in pores; 25 percent subrounded cobbles and 25 percent gravel; slightly acid (pH 6.2); clear smooth boundary.

2Cr—42 inches; strongly weathered basalt.

The thickness of the mollic epipedon ranges from 10 to 20 inches. The thickness of the solum and the depth to paralithic contact of strongly weathered basalt range from 40 to 60 inches. Base saturation is 50 to 75 percent to a depth of 30 inches. Some pedons have an O horizon, which is 2 to 6 inches thick. Reaction is slightly acid or neutral throughout the profile. Rock fragments are highly weathered or are saprolitic near the paralithic contact in some pedons.

The A and BAt horizons have dry color of 7.5YR 5/4 or 10YR 5/3 or 5/2. Moist color is 5YR 3/3 or 7.5YR 3/2. The content of rock fragments, mostly gravel, ranges from 15 to 35 percent. The content of organic matter ranges from 2 to 5 percent.

The 2Bt horizon has dry color of 7.5YR 6/4, 5/4, 4/6, or 4/4. Moist color is 5YR 4/4 or 3/4 or 7.5YR 4/4 or 3/4. The texture is very gravelly sandy clay loam, cobbly sandy clay loam, or very cobbly sandy clay loam. The content of clay in the upper 20 inches of the argillic horizon ranges from 20 to 27 percent. The content of rock fragments, mostly subrounded cobbles, ranges from 35 to 80 percent in at least the top 20 inches of the argillic horizon.

Jacksback Series

The Jacksback series consists of very deep, poorly drained soils that formed in alluvium derived from andesitic rock. These soils are on terraces. Slopes range from 0 to 9 percent. The mean annual precipitation is 35 to 50 inches, and the mean annual temperature is 39 to 41 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, frigid Aquultic Haploxerolls

Typical Pedon

Jacksback loam, in an area of Gardens-Jacksback complex, 0 to 2 percent slopes, about 10 miles southwest of Burney; 1,450 feet west and 200 feet south of the northeast corner of sec. 12, T. 33 N., R. 2 E., Manzanita Lake NW (Jacks Backbone) quadrangle (7.5 minute series):

A1—0 to 5 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; moderate medium platy structure parting to moderate very fine subangular blocky; soft, very friable, nonsticky and nonplastic; common very fine and

few fine roots; many very fine interstitial pores; 10 percent gravel; slightly acid (pH 6.0); abrupt smooth boundary.

A2—5 to 12 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; common very fine and few fine and medium roots; common very fine interstitial pores; 10 percent gravel; slightly acid (pH 6.1); clear smooth boundary.

Bw1—12 to 21 inches; brown (10YR 5/3) loam, brown (10YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine interstitial pores; 5 percent gravel; slightly acid (pH 6.1); abrupt smooth boundary.

Bw2—21 to 34 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 4/3) moist; few fine distinct black and strong brown (N 2/0 and 7.5YR 4/6 moist) iron accumulations; moderate fine subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; 10 percent gravel; slightly acid (pH 6.5); clear smooth boundary.

Bw3—34 to 42 inches; yellowish brown and pale brown (10YR 5/4 and 6/3) sandy clay loam, dark yellowish brown (10YR 4/4) moist; few fine distinct black and strong brown (N 2/0 and 7.5YR 4/6 moist) iron accumulations; moderate medium subangular blocky structure; hard, firm, slightly sticky and plastic; few very fine roots; many very fine tubular pores; 10 percent fine and medium irregular durinodes; 5 percent gravel; slightly acid (pH 6.5); abrupt smooth boundary.

Bq1—42 to 52 inches; light yellowish brown (10YR 6/4) sandy loam, yellowish brown (10YR 5/4) moist; few fine distinct yellowish brown (10YR 5/8 moist) iron accumulations; moderate medium platy structure; very hard, very firm, slightly sticky and plastic; common very fine tubular pores; few thick clay films on faces of peds; 60 percent irregular durinodes; 10 percent gravel; neutral (pH 7.0); abrupt smooth boundary.

Bq2—52 to 61 inches; very pale brown (10YR 7/3) very fine sandy loam, yellowish brown (10YR 5/4) moist; many medium distinct dark brown (7.5YR 3/4 moist) iron accumulations; massive; hard, firm, nonsticky and nonplastic; common very fine tubular pores; 30 percent fine and medium irregular durinodes; neutral (pH 7.0); abrupt smooth boundary.

C1—61 to 72 inches; very pale brown (10YR 7/4) coarse sandy loam, yellowish brown (10YR 5/4) moist; many medium distinct dark yellowish brown (10YR 4/6 moist) iron accumulations; massive; slightly hard, firm, nonsticky and nonplastic; many very fine interstitial pores; neutral (pH 7.0); abrupt smooth boundary.

C2—72 to 75 inches; very pale brown (10YR 7/4) sandy loam, yellowish brown (10YR 5/4) moist; many medium distinct strong brown (7.5YR 5/8 moist) iron accumulations; strong thin platy structure; very hard, very firm, nonsticky and nonplastic; few very fine tubular pores; common fine rounded iron-manganese concretions; neutral (pH 7.0); abrupt smooth boundary.

C3—75 to 80 inches; very pale brown (10YR 7/4) silt loam, brown or dark brown (10YR 4/3) moist; many medium distinct strong brown (7.5YR 4/6 moist) iron accumulations; massive; hard, firm, nonsticky and plastic; common fine tubular pores; neutral (pH 7.0).

The thickness of the solum ranges from 40 to 60 inches. The particle-size control section (10 to 40 inches) averages 18 to 27 percent clay and 5 to 10 percent rock fragments.

The A horizon has dry color of 10YR 4/2, 5/2, or 5/3. Moist color is 10YR 2/2, 3/2, or 3/3. The content of organic matter is assumed to be 1 to 2 percent. The content of clay ranges from 20 to 25 percent. The content of rock fragments, mostly gravel, ranges from 5 to 10 percent. NaF pH ranges from 9.5 to 9.8.

The Bw horizon has dry color of 10YR 5/3, 6/3, or 5/4. Moist color is 10YR 4/3 or 4/4. Moist color of the redoximorphic features is N 2/0 or 7.5YR 4/4, 4/6, 5/6, or 5/8. The Bw horizon is loam or sandy clay loam. The content of clay ranges from 25 to 30 percent. The content of rock fragments, mostly gravel, ranges from 5 to 10 percent. NaF pH ranges from 9.0 to 9.5.

The Bq horizon has dry color of 10YR 6/4, 7/3, 7/4, or 8/3. Moist color is 10YR 5/4 or 6/4. Moist color of the redoximorphic features is 10YR 5/8 or 7.5YR 4/6 or 5/8. The content of clay in this horizon ranges from 12 to 18 percent. The content of rock fragments, mostly gravel, ranges from 5 to 10 percent.

The C horizon has dry color of 10YR 7/3, 7/4, or 8/1 or 7.5YR 5/4. Moist color is 10YR 4/3, 6/3, or 5/4 or 7.5YR 5/4. Moist color of the redoximorphic features is 7.5YR 3/4, 4/6, or 5/8; 10YR 4/6; or 2.5Y 4/2, 6/2, or 5/4. The C horizon is very fine sandy loam, coarse sandy loam, sandy loam, or silt loam. The content of clay ranges from 12 to 20 percent. The content of rock fragments, mostly gravel, ranges from 5 to 10 percent.

Jadpor Series

The Jadpor series consists of very deep, well drained soils that formed in alluvium derived from extrusive igneous rock. These soils are on alluvial terraces. Slopes range from 0 to 5 percent. The mean annual precipitation is 16 to 30 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Loamy-skeletal, mixed, superactive, mesic Pachic Argixerolls

Typical Pedon

Jadpor very gravelly sandy loam, 0 to 5 percent slopes, about 10 miles northeast of Burney, 1 mile east of the Highway 299 Pit River Bridge, south on a dirt road, then 0.3 mile southwest, 50 feet south of a dirt road; 1,500 feet south and 500 feet east of the northwest corner of sec. 16, T. 4 E., R. 36 N., Burney NE (Cassel) quadrangle (7.5 minute series):

A1—0 to 5 inches; dark gray (10YR 4/1) very gravelly sandy loam, black (10YR 2/1) moist; moderate medium granular structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine interstitial pores; 50 percent rounded gravel and 10 percent rounded cobbles; moderately acid (pH 6.0); gradual smooth boundary.

A2—5 to 12 inches; dark gray (10YR 4/1) extremely cobbly sandy loam, black (10YR 2/1) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine, fine, and medium and few coarse roots; common very fine interstitial pores; 35 percent rounded gravel and 40 percent rounded cobbles; neutral (pH 7.0); clear smooth boundary.

Bt1—12 to 23 inches; brown (10YR 5/3) extremely cobbly sandy clay loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots; common very fine interstitial pores; common thin clay films bridging mineral grains; 35 percent rounded gravel and 40 percent rounded cobbles; neutral (pH 7.0); clear wavy boundary.

Bt2—23 to 32 inches; pale brown (10YR 6/3) extremely cobbly sandy loam, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine, and medium roots; common very fine interstitial pores; common moderately thick clay films bridging mineral grains; 35 percent rounded gravel, 35 percent rounded cobbles, and 15 percent rounded stones, many with silica coating on the lower surfaces; neutral (pH 7.0); gradual wavy boundary.

C1—32 to 45 inches; pale brown (10YR 6/3) extremely cobbly coarse sandy loam, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; common very fine interstitial pores; 35 percent rounded gravel, 35 percent rounded cobbles, 15 percent rounded stones; neutral (pH 7.0); abrupt wavy boundary.

C2—45 to 61 inches; pale brown (10YR 6/3) extremely cobbly coarse sandy loam, brown (10YR 4/3) moist; single grain: loose, nonsticky and nonplastic; few very fine and fine roots; common very fine interstitial pores; 35 percent rounded gravel, 35 percent rounded cobbles, and 15 percent rounded stones, all coated with silica; neutral (pH 7.0).

The thickness of the solum ranges from 25 to 50 inches. The particle-size control section (12 to 32 inches) ranges from 15 to 32 percent clay and 35 to 80 percent rock fragments, mostly gravel and cobbles. The content of rock fragments on the surface, mostly gravel, ranges from 10 to 60 percent. The content of organic matter ranges from 1 to 5 percent to a depth of 20 to 25 inches and decreases regularly with depth.

The A horizon has dry color of 10YR 5/2, 5/1, 4/2, or 4/1. Moist color is 10YR 3/2, 3/1, 2/2, or 2/1. The texture is very gravelly sandy loam, extremely gravelly sandy loam, or extremely cobbly sandy loam. The content of clay ranges from 12 to 16 percent. The content of rock fragments, mostly gravel or cobbles, ranges from 35 to 80 percent. Reaction ranges from moderately acid to neutral.

The Bt horizon has dry color of 7.5YR 5/4 or 6/4 or 10YR 5/3 or 6/3. Moist color is 7.5YR 4/4 or 10YR 3/3 or 4/3. The texture is extremely cobbly sandy loam or extremely cobbly sandy clay loam. The content of clay ranges from 20 to 32 percent. The content of rock fragments, mostly gravel or cobbles, ranges from 60 to 80 percent. The fragments commonly have silica coatings. Reaction is slightly acid or neutral.

The C horizon has dry color of 7.5YR 5/4 or 10YR 6/3. Moist color is 7.5YR 4/4 or 10YR 4/3. The texture is extremely cobbly or stony coarse sandy loam. The content of clay ranges from 5 to 20 percent. The content of rock fragments ranges from 60 to 90 percent. Reaction is slightly acid or neutral.

Jahjo Series

The Jahjo series consists of very shallow and shallow, well drained soils that formed in tephra.

These soils are on lava ridges and in pockets between lava flows. Slopes range from 2 to 15 percent. The mean annual precipitation is 16 to 25 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Loamy, mixed, superactive, mesic Lithic Xerumbrepts

Typical Pedon

Jahjo extremely cobbly fine sandy loam, in an area of Jahjo-Lava flows-Loveness complex, 2 to 15 percent slopes, about 9 miles southwest of Tionesta; 600 feet east and 800 feet south of the northwest corner of sec. 6, T. 42 N., R. 6 E., Timber Mountain SE (Kephart) quadrangle (7.5 minute series):

A1—0 to 2 inches; brown (10YR 5/3) extremely cobbly fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine interstitial pores; 70 percent cobbles; moderately acid (pH 6.0); abrupt smooth boundary.

A2—2 to 6 inches; brown (10YR 5/3) fine sandy loam, dark brown (7.5YR 3/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; few very fine interstitial pores; 10 percent gravel; slightly acid (pH 6.5); abrupt smooth boundary.

Bw—6 to 12 inches; yellowish brown (10YR 5/4) loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine interstitial pores; 10 percent gravel; slightly acid (pH 6.5); abrupt smooth boundary.

2R—12 inches; hard basalt.

The depth to lithic contact ranges from 10 to 14 inches. The particle-size control section averages 10 to 18 percent clay and 10 to 15 percent rock fragments, mostly gravel. The content of rock fragments on the surface, mostly cobbles, ranges from 35 to 75 percent.

The A horizon has dry color of 10YR 5/2, 5/3, or 5/4. Moist color is 10YR 2/1, 3/1, 3/2, or 3/3 or 7.5YR 3/2. The content of clay ranges from 10 to 12 percent. The content of rock fragments, mostly cobbles or gravel, ranges from 10 to 80 percent. The content of organic matter ranges from 2 to 5 percent. Base saturation by ammonium acetate ranges from 25 to 36 percent. NaF pH ranges from 10.5 to 11.5. Reaction is slightly acid or moderately acid.

The Bw horizon has dry color of 10YR 5/2, 5/3, or 5/4 or 7.5YR 4/4. Moist color is 10YR 3/2 or 3/3 or 7.5YR 3/2. The content of clay ranges from 12 to 18 percent. The content of rock fragments, mostly gravel, ranges from 10 to 15 percent. The content of organic matter ranges from 1 to 3 percent. Base saturation by ammonium acetate ranges from 35 to 50 percent. NaF pH ranges from 10.5 to 12.0.

Jellico Series

The Jellico series consists of moderately deep, well drained soils that formed in volcanic ashfall mixed with basalt flow material. These soils are on hills and plateaus. Slopes range from 5 to 50 percent. The mean annual precipitation is about 16 to 20 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Loamy-skeletal, mixed, superactive, mesic Ultic Argixerolls

Typical Pedon

Jellico very stony silt loam, in an area of Jellico-Lava flows complex, 5 to 15 percent slopes, approximately 5 miles southeast of Fall River Mills, 330 feet north of the Cindercone Resource Area Road; 2,625 feet east and 590 feet north of the southwest corner of sec. 16, T. 36 N., R. 5 E., Jellico NE (Cable Mountain) quadrangle (7.5 minute series):

A1—0 to 5 inches; yellowish brown (10YR 5/4) very stony silt loam, dark brown (7.5YR 3/2) moist; moderate thin platy structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; 25 percent stones, 10 percent cobbles, 10 percent gravel; slightly acid (pH 6.5); clear smooth boundary.

A2—5 to 10 inches; yellowish brown (10YR 5/4) very stony silt loam, dark brown (7.5YR 3/2) moist; strong fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; 25 percent stones, 10 percent cobbles, 10 percent gravel; neutral (pH 7.0); clear wavy boundary.

Bt1—10 to 15 inches; yellowish brown (10YR 5/4) very cobbly silt loam, dark brown (7.5YR 3/4) moist; moderate fine angular blocky structure; very hard, friable, sticky and plastic; few very fine roots; few very fine tubular pores; few thin clay films on faces of peds; 10 percent stones, 40 percent cobbles, 5 percent gravel; neutral (pH 7.0); gradual smooth boundary.

Bt2—15 to 27 inches; yellowish brown (10YR 5/4) very stony silt loam, brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; hard,

firm, sticky and plastic; few very fine and fine roots; few very fine tubular pores; few thin clay films on faces of peds; 40 percent stones, 10 percent cobbles, 5 percent gravel; neutral (pH 7.0); clear smooth boundary.

Bt3—27 to 33 inches; variegated light yellowish brown (10YR 6/4) and yellowish brown (10YR 5/4) extremely stony silt loam, strong brown (7.5YR 4/6) and brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; hard, friable, sticky and plastic; few very fine and fine roots; few very fine tubular pores; few thin clay films on faces of peds; 50 percent stones, 10 percent cobbles, 5 percent gravel; neutral (pH 7.0); abrupt smooth boundary.

R—33 inches; basalt; few cracks less than 1 mm wide.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches.

The A horizon has dry color of 10YR 5/2, 5/3, 5/4, or 4/3 or 7.5YR 4/2. Moist color is 10YR 3/2 or 3/3 or 7.5YR 3/2. The content of cobbles or stones ranges from 30 to 40 percent, and the content of gravel ranges from 5 to 10 percent. Reaction is slightly acid or neutral. Base saturation ranges from 50 to 75 percent.

The Bt horizon has dry color of 10YR 4/4, 5/3, 5/4, or 6/4 or 7.5YR 4/4 or 6/4. Moist color is 10YR 3/3 or 3/4; 7.5YR 3/4, 4/2, 4/4, or 4/6; or 5YR 3/2 or 4/4. The content of cobbles or stones ranges from 30 to 70 percent, and the content of gravel ranges from 5 to 10 percent. The content of clay averages 18 to 27 percent.

Jellycamp Series

The Jellycamp series consists of shallow, moderately well drained soils that formed in alluvium derived from extrusive igneous rock. These soils are on lava plateaus. Slopes are 2 to 15 percent. The mean annual precipitation is 12 to 18 inches, and the mean annual temperature is 45 to 50 degrees F.

Taxonomic classification: Clayey, smectitic, mesic, shallow Abruptic Argiduridic Durixerolls

Typical Pedon

Jellycamp very cobbly loam, in an area of Jellycamp-Ollierivas complex, 2 to 9 percent slopes, about 5 miles southeast of McArthur; 3.3 miles southeast of the intersection of Pittville Road and the BLM Cindercone Road; 1,850 feet south and 300 feet east of the northwest corner of sec. 31, T. 36 N., R. 6 E., Jellico NE (Cable Mountain) quadrangle (7.5 minute series):

A1—0 to 3 inches; brown (10YR 5/3) very cobbly loam, dark brown (10YR 3/3) moist; weak thin platy structure; slightly hard, very friable, slightly sticky and nonplastic; many very fine roots; common very fine tubular pores; 5 percent gravel and 40 percent cobbles; neutral (pH 7.0); abrupt smooth boundary.

A2—3 to 6 inches; brown (10YR 4/3) very cobbly loam, dark brown (10YR 3/3) moist; weak fine angular blocky structure; hard, friable, sticky and slightly plastic; common fine and many medium roots; common very fine tubular pores; 30 percent cobbles and 5 percent gravel; neutral (pH 7.0); abrupt smooth boundary.

Bt—6 to 11 inches; brown (10YR 4/3) clay, dark brown (10YR 3/3) moist; strong medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, very sticky and very plastic; few very fine roots; few very fine tubular pores; many moderately thick clay films on peds and in pores; 10 percent fine manganese concretions; neutral (pH 7.0); abrupt smooth boundary.

Bqm—11 to 16 inches; brown (10YR 5/3), strongly cemented duripan; laminar to very thick platy structure; continuous indurated silica cap with common manganese stains; roots are matted on top of the silica cap; neutral (pH 7.0); abrupt smooth boundary.

2R—16 to 40 inches; hard tuff; abrupt smooth boundary.

3R—40 inches; hard vesicular basalt; few fractures.

Depth to the duripan ranges from 10 to 20 inches. The depth to lithic contact is 15 to 35 inches. The content of rock fragments on the surface ranges from 0 to 90 percent. The thickness of the mollic epipedon ranges from 8 to 14 inches.

The A horizon has dry color of 10YR 4/2, 4/3, 5/2, or 5/3 or 7.5YR 4/2, 4/4, 5/2, or 5/4. Moist color is 10YR 3/1, 3/2, or 3/3; 7.5YR 3/2; or 5YR 3/2 or 3/3. The content of organic matter is 1 to 2 percent. The texture is loam, sandy loam, very cobbly loam, extremely stony loam, extremely gravelly sandy loam, or very gravelly loam. The content of clay ranges from 10 to 27 percent. Reaction is neutral or slightly alkaline. Base saturation by ammonium acetate ranges from 85 to 100 percent.

The Bt horizon has dry color of 10YR 4/3, 5/3, or 5/4; 7.5YR 5/2, 5/4, or 5/6; or 5YR 4/2 or 4/4. Moist color is 10YR 3/2, 3/3, 3/4; 7.5YR 3/2, 4/2, or 4/4; or 5YR 3/2, 3/3, or 3/4. Reaction is neutral or slightly alkaline. Base saturation by ammonium acetate ranges from 95 to 100 percent. The content of clay

ranges from 40 to 60 percent. The content of rock fragments ranges from 0 to 10 percent.

The Bqm horizon is indurated or is strongly cemented with an indurated cap. The silica-cemented cap is continuous and ranges in thickness from 1/4 to 1 inch.

Jimmerson Series

The Jimmerson series consists of very deep, well drained soils that formed in old tephra deposits and material from lava flows. Slopes range from 2 to 50 percent. The mean annual precipitation is 25 to 35 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Vitrandic Palexeralfs

Typical Pedon

Jimmerson loam, in an area of Jimmerson loam-Jimmerson stony loam complex, 2 to 15 percent slopes, about 1.5 miles northwest of Burney at the intersection of Highway 299 and Timber Drive, 900 feet from the first dirt road past the power line off Timber Drive and 200 feet on the east side of the dirt road; 1,700 feet east and 800 feet south of the northwest corner of sec. 18, T. 35 N., R. 3 E., Burney NW (Burney) quadrangle (7.5 minute series):

Oi—1 inch to 0; slightly decomposed pine needles, oak leaves, and twigs.

A1—0 to 2 inches; reddish brown (5YR 5/4) loam, dark reddish brown (5YR 3/4) moist; strong fine granular structure; hard, friable, nonsticky and nonplastic; common fine roots; many fine interstitial pores; 14 percent gravel; moderately acid (pH 5.9); abrupt smooth boundary.

A2—2 to 5 inches; yellowish red (5YR 4/6) loam, dark reddish brown (5YR 3/4) moist; moderate fine subangular blocky structure; hard, friable, nonsticky and nonplastic; many fine roots; many fine interstitial pores; 12 percent gravel; slightly acid (pH 6.2); clear wavy boundary.

Bt1—5 to 11 inches; yellowish red (5YR 5/6) loam, dark reddish brown (5YR 3/4) moist; strong fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many fine roots; common fine tubular and interstitial pores; few thin clay films in pores; 10 percent gravel; slightly acid (pH 6.2); clear wavy boundary.

Bt2—11 to 19 inches; yellowish red (5YR 5/6) loam, reddish brown (5YR 4/4) moist; moderate fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many fine and coarse roots; many fine and few medium tubular pores; few moderately thick clay films in pores; slightly acid (pH 6.3); clear smooth boundary.

Bt3—19 to 24 inches; strong brown (7.5YR 5/6) loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and plastic; many coarse and common fine and medium roots; many very fine and common fine tubular pores; few moderately thick clay films in pores; 8 percent gravel; slightly acid (pH 6.5); abrupt wavy boundary.

2Bt4—24 to 36 inches; strong brown (7.5YR 5/6) clay loam, brown (7.5 5/4) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and plastic; common fine and medium roots; common very fine tubular pores; common thick clay films in pores and common thin clay films on peds; 5 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

2Bt5—36 to 50 inches; strong brown (7.5YR 5/6) clay loam, strong brown (7.5YR 4/6) moist; moderate medium angular blocky structure; very hard, firm, sticky and plastic; few fine and medium roots; common very fine tubular pores; common moderately thick clay films in pores and common moderately thick and few thick clay films on peds; neutral (pH 6.7); gradual wavy boundary.

2Bt6—50 to 62 inches; strong brown (7.5YR 5/6) cobbly clay loam, strong brown (7.5YR 4/6) moist; moderate fine angular blocky structure; very hard, firm, sticky and plastic; common very fine roots; few very fine tubular pores; many moderately thick clay films in pores and on peds; 15 percent cobbles and 10 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

2Bt7—62 to 70 inches; strong brown (7.5YR 5/6) clay loam, strong brown (7.5YR 4/6) moist; strong fine angular blocky structure; very hard, firm, sticky and plastic; few very fine roots; few very fine tubular pores; many moderately thick clay films in pores and on peds; neutral (pH 6.6).

The A horizon has dry color of 7.5YR 4/2, 4/4, 4/6, 5/4, or 5/6 or 5YR 5/4, 4/6, or 4/4. Moist color is 7.5YR 3/4 or 5YR 3/4. Base saturation by ammonium acetate ranges from 50 to 60 percent. Base saturation by sum of cations ranges from 50 to 55 percent. This horizon is loam or stony sandy loam. The content of rock fragments, mostly stones and gravel, ranges from 0 to 30 percent. Reaction ranges from moderately acid to neutral. The content of clay ranges from 12 to 20 percent and includes a small amount of halloysite clay. NaF pH ranges from 9.6 to

10.0. The content of glass ranges from 10 to 15 percent. Aluminum plus $^{1}/_{2}$ iron is 1.0 to 1.5. Bulk density ranges from 1.0 to 1.5 g/cc.

The Bt horizon has dry color of 7.5YR 4/4, 5/4, 4/6, 5/6, 5/8, 6/6, or 6/8 or 5YR 4/4, 4/6, or 5/6. Moist color is 10YR 4/6; 7.5YR 3/4, 5/4, 4/4, or 4/6; 5YR 3/4, 4/4, or 4/6; or 2.5YR 3/4, 4/6, or 3/6. The texture is loam, clay loam, silty clay loam, cobbly loam, or cobbly clay loam with 18 to 35 percent clay in the upper part and an average of 18 to 30 percent in the control section; or clay loam, silty clay loam, clay, cobbly clay, or cobbly clay loam with 35 to 50 percent clay in the lower part. Halloysite is the dominant clay. The content of rock fragments, mostly cobbles and gravel, ranges from 0 to 30 percent. Reaction ranges from moderately acid to neutral. Base saturation by ammonium acetate ranges from 55 to 75 percent. Base saturation by sum of cations ranges from 45 to 60 percent. NaF pH ranges from 9.1 to 9.6.

Karcal Series

The Karcal series consists of moderately deep, well drained soils that formed in alluvium derived from basalt and tuff. These soils are on plateaus. Slopes range from 2 to 15 percent. The mean annual precipitation is 10 to 16 inches, and the mean annual temperature is 45 to 47 degrees F.

Taxonomic classification: Fine, smectitic, mesic Leptic Haploxererts

Typical Pedon

Karcal cobbly silty clay, in an area of Karcal-Cuppy complex, 2 to 15 percent slopes; about 2 miles southeast of Dixie Valley Ranch Headquarters; 1,200 feet south and 3,400 feet east of the northwest corner of sec. 35, T. 35 N., R. 8 E., Little Valley SE (Straylor Lake) quadrangle (7.5 minute series):

A—0 to 2 inches; brown (7.5YR 4/2) cobbly silty clay, dark brown (10YR 3/3) moist; moderate fine granular structure; slightly hard, very friable, sticky and plastic; few very fine roots; common very fine interstitial pores; 20 percent basalt cobbles; neutral (pH 7.0); abrupt smooth boundary.

Ass—2 to 15 inches; brown (7.5YR 5/2) cobbly silty clay, dark grayish brown (10YR 4/2) moist; strong coarse prismatic structure; hard, friable, sticky and plastic; few very fine interstitial and tubular pores; common pressure faces and slickensides; 20 percent basalt cobbles; neutral (pH 7.3); clear smooth boundary.

Bss1—15 to 20 inches; brown (7.5YR 5/2) silty clay, brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium angular blocky; hard, friable, sticky and plastic; common very fine and fine roots between peds; few very fine and fine tubular pores; common pressure faces and slickensides; 5 percent basalt cobbles; neutral (pH 7.3); gradual wavy boundary.

Bss2—20 to 29 inches; brown (7.5YR 5/4) silty clay, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure parting to weak fine prismatic; hard, friable, sticky and plastic; common fine and medium roots between peds; common medium and coarse interstitial and tubular pores; common pressure faces and intersecting slickensides; strongly effervescent; 5 percent basalt cobbles; moderately alkaline (pH 8.0); abrupt wavy boundary.

2R—29 inches; hard tuff; coatings of carbonates on the surface.

The depth to bedrock ranges from 20 to 30 inches. The particle-size control section (10 inches to the lithic contact) ranges from 40 to 50 percent clay and from 0 to 15 percent rock fragments, mostly cobbles. The content of rock fragments on the surface, mostly cobbles, ranges from 10 to 25 percent. Cracks $^{1}/_{4}$ inch to 2 inches wide extend to a depth of 20 to 30 inches when the soil is dry. Few or common intersecting slickensides are in the Ass and Bss horizons at a depth of 8 to 30 inches.

The A horizon has dry color of 7.5YR 4/2, 5/2, or 5/4. The content of organic matter is 0.5 to 1.0 percent. The content of rock fragments, mostly cobbles, ranges from 15 to 25 percent.

The Bss horizon has dry color of 7.5YR 4/2, 4/4, 5/2, or 5/4. Moist color is 10YR 4/3 or 3/3 or 7.5YR 4/4. The content of organic matter is 0.5 to 1.0 percent. The content of clay ranges from 40 to 50 percent. The content of rock fragments, mostly cobbles, ranges from 0 to 15 percent.

Keddie Series

The Keddie series consists of very deep, poorly drained soils that formed in alluvium weathered from basic igneous rock and lake sediments. These soils are on flood plains. Slopes range from 0 to 2 percent. The mean annual precipitation is 25 to 35 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Cumulic Endoaquolls

Typical Pedon

Keddie muck, 0 to 1 percent slopes, about 1 mile south of Cassel; 500 feet east and 500 feet south of

the northwest corner of sec. 17, T. 35 N., R. 4 E., Burney NE (Cassel) quadrangle (7.5 minute series):

Oa—0 to 4 inches; black (10YR 2/1) muck, black (10YR 2/1) moist; moderate very fine granular structure; soft, very friable, very smeary, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; neutral (pH 7.0); abrupt smooth boundary.

A1—4 to 16 inches; dark yellowish brown (10YR 4/4) loam, very dark grayish brown (10YR 3/2) moist; many fine distinct strong brown (7.5YR 4/6 moist) iron accumulations; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine tubular pores; 10 percent gravel; neutral (pH 7.0); abrupt smooth boundary.

A2—16 to 32 inches; dark yellowish brown (10YR 4/4) loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common fine roots; many very fine tubular pores; 5 percent gravel; a layer of organic material less than 1 inch thick at a depth of 20 inches; neutral (pH 7.0); abrupt smooth boundary.

A3—32 to 42 inches; yellowish brown (10YR 5/4) loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; soft, friable, slightly sticky and plastic; common fine and medium roots; common very fine tubular pores; 15 percent gravel; neutral (pH 7.0); abrupt smooth boundary.

C1—42 to 52 inches; dark yellowish brown (10YR 4/6) loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; soft, friable, nonsticky and nonplastic; few very fine roots; many very fine tubular pores; 15 percent gravel; neutral (pH 7.0); abrupt smooth boundary.

C2—52 to 64 inches; dark yellowish brown (10YR 4/6) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; massive; very soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 60 percent gravel; neutral (pH 7.0).

The depth to very gravelly material ranges from 40 to 60 inches. The particle-size control section (10 to 40 inches) ranges from 18 to 27 percent clay and from 0 to 15 percent rock fragments, mostly gravel.

The Oa horizon has dry color of 10YR 2/1, 3/2, 4/3, or 4/4. Moist color is 10YR 2/1 or N 2/0.

The A horizon has dry color of 10YR 4/2, 4/3, 4/4, or 5/4. Moist color is 10YR 3/2, 4/4, or 5/4. The texture is loam or silt loam. The content of clay ranges from 18 to 27 percent. The content of rock fragments, mostly gravel, ranges from 0 to 15 percent.

The C horizon has dry color of 10YR 4/6, 5/6, or 6/6. Moist color is 10YR 4/4 or 5/4. The content of clay ranges from 10 to 25 percent. The content of rock fragments, mostly gravel, ranges from 15 to 60 percent.

Kephart Series

The Kephart series consists of very deep, well drained soils that formed in tephra over basalt lava flows. These soils are on lava plateaus and escarpments. Slopes range from 2 to 30 percent. The mean annual precipitation is 16 to 25 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Vitrandic Haploxeralfs

Typical Pedon

Kephart very gravelly loamy coarse sand (fig. 15), in an area of Kephart-Quaking complex, 2 to 15 percent slopes, about 6.3 miles southwest of Tionesta; 200 feet south and 2,400 feet west of the northeast corner of sec. 16, T. 43 N., R. 5 E., Timber Mountain SW (West of Kephart) quadrangle (7.5 minute series):

Oi—3 inches to 0; recent and decomposing pine litter.

A—0 to 3 inches; dark grayish brown (10YR 4/2) very gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and medium and common fine roots; few very fine interstitial pores; 40 percent pumice gravel; slightly acid (pH 6.2); abrupt smooth boundary.

C—3 to 8 inches; light brownish gray (10YR 6/2) extremely gravelly coarse sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; common very fine and few fine roots; few very fine interstitial pores; 90 percent pumice gravel; slightly acid (pH 6.2); abrupt smooth boundary.

Ab1—8 to 12 inches; brown (7.5YR 5/4) coarse sandy loam, dark brown (7.5YR 3/4) moist; moderate fine subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; common fine and medium roots; common fine tubular pores; 10 percent gravel; slightly acid (pH 6.4); abrupt smooth boundary.

Ab2—12 to 19 inches; brown (7.5YR 5/4) coarse sandy loam, dark brown (7.5YR 3/4) moist; weak very fine subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; many

fine and common medium roots; common very fine tubular pores; 10 percent gravel; slightly acid (pH 6.4); abrupt smooth boundary.

Bwb—19 to 25 inches; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 3/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine, common medium, and few coarse roots; common very fine tubular pores; 10 percent gravel; slightly acid (pH 6.4); clear smooth boundary.

Btb1—25 to 35 inches; brown (7.5YR 5/4) sandy clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine and few medium and coarse roots; few very fine tubular pores; common thin clay films in pores; 10 percent gravel; slightly acid (pH 6.4); gradual smooth boundary.

Btb2—35 to 44 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common fine and few medium and coarse roots; few very fine tubular pores; common thin clay films in pores; 10 percent gravel; neutral (pH 6.6); gradual smooth boundary.

Btb3—44 to 54 inches; light yellowish brown (10YR 6/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common fine and few medium and coarse roots; common very fine tubular pores; common moderately thick clay films in pores; 10 percent gravel; neutral (pH 6.6); gradual smooth boundary.

Btb4—54 to 68 inches; light yellowish brown (10YR 6/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine roots; common very fine tubular pores; common moderately thick clay films in pores; 10 percent gravel; neutral (pH 6.6).

The depth to bedrock is more than 60 inches. The particle-size control section (25 to 45 inches) ranges from 20 to 27 percent clay and from 5 to 15 percent rock fragments. Some pedons have a C horizon below a depth of 60 inches.

The A horizon has dry color of 10YR 5/1, 4/2, 5/2, or 6/2. Moist color is 10YR 4/1, 3/2, 4/2, or 3/3. The content of organic matter ranges from 2 to 5 percent. The content of clay ranges from 3 to 10 percent. The content of rock fragments, mostly pumice gravel, ranges from 35 to 60 percent. NaF pH ranges from 8.0 to 8.8.

The C horizon has dry color of 10YR 6/2, 7/2, 8/2, or 8/1. Moist color is 10YR 4/2, 6/2, or 7/2. The content of organic matter is 1 to 2 percent. The content of clay ranges from 1 to 5 percent. The content of rock fragments, mostly pumice gravel, ranges from 60 to 90 percent. NaF pH ranges from 9.6 to 10.0.

The Ab horizon has dry color of 7.5YR 5/4 or 10YR 5/4. Moist color is 7.5YR 3/4 or 10YR 3/4. The content of organic matter is 0.95 to 1.5 percent. The content of clay ranges from 10 to 18 percent. The content of rock fragments, mostly gravel, ranges from 5 to 15 percent. NaF pH ranges from 8.6 to 10.0. The content of volcanic glass ranges from 5 to 12 percent. Aluminum and $^{1}/_{2}$ iron by ammonium oxalate ranges from 0.5 to 1.0.

The Bwb horizon has dry color of 7.5YR 5/4 or 5/6. Moist color is 7.5YR 3/4 or 4/4. The content of organic matter is 0.6 to 0.8 percent. The content of clay ranges from 12 to 20 percent. The content of rock fragments, mostly gravel, ranges from 5 to 15 percent. NaF pH ranges from 8.5 to 9.0. The content of volcanic glass ranges from 5 to 13 percent. Aluminum and $^{1}/_{2}$ iron by ammonium oxalate ranges from 0.5 to 1.0.

The Btb horizon has dry color of 7.5YR 5/4 or 5/6 or 10YR 5/3, 5/4, or 6/4. Moist color is 7.5YR 3/4, 4/4, or 4/6 or 10YR 4/4. The content of organic matter is 0.3 to 0.5 percent. The content of clay ranges from 20 to 27 percent. The content of rock fragments, mostly gravel, ranges from 5 to 15 percent. NaF pH ranges from 8.6 to 9.0. Reaction is slightly acid or neutral.

Kettlebelly Series

The Kettlebelly series consists of very deep, well drained soils that formed in material derived from metasediments. These soils are on mountains. Slopes range from 5 to 75 percent. The mean annual temperature is 45 to 50 degrees F, and the mean annual precipitation is 40 to 60 inches.

Taxonomic classification: Clayey, parasesquic, mesic Xeric Palehumults

Typical Pedon

Kettlebelly gravelly loam, in an area of Kettlebelly-Neuns complex, 15 to 30 percent slopes, about 7 miles south of McCloud, 1.2 miles north of the gate of Squaw Valley Creek, 50 yards upslope from a clearing on the road on an old logging skid trail; 1,200 feet east and 1,200 feet south of the northwest corner of sec. 2, T. 38 N., R. 3 W., Shoeinhorse Mountain NW (Girard Ridge) quadrangle (7.5 minute series):

Oi—1 inch to 0; decomposing needles, twigs, leaves, and other organic debris.

A1—0 to 4 inches; light brown (7.5YR 6/4) gravelly loam, dark brown (7.5YR 3/4) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and common fine roots; common very fine and fine interstitial pores; 25 percent gravel; moderately acid (pH 5.8); clear smooth boundary.

A2—4 to 10 inches; reddish yellow (5YR 6/6) gravelly loam, dark brown (7.5YR 3/4) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine and few medium roots; common very fine and fine interstitial pores; 22 percent gravel; moderately acid (pH 5.6); clear smooth boundary.

Bt1—10 to 15 inches; reddish yellow (5YR 6/6) silty clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and few medium roots; common fine interstitial and tubular pores; very few thin clay films on peds; 10 percent gravel; strongly acid (pH 5.4); clear smooth boundary.

Bt2—15 to 25 inches; light red (2.5YR 6/6) silty clay, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots; common fine interstitial and tubular pores; very few thin clay films on peds; 10 percent gravel; strongly acid (pH 5.4); clear wavy boundary.

Bt3—25 to 42 inches; light red (2.5YR 6/6) silty clay, red (2.5YR 4/6) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots; common fine tubular and interstitial pores; few thin clay films on peds and in pores; strongly acid (pH 5.4); clear wavy boundary.

Bt4—42 to 52 inches; light red (2.5YR 6/6) silty clay, red (2.5YR 4/8) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and common medium roots; few fine tubular pores; few thin clay films on peds and in pores; strongly acid (pH 5.2); clear wavy boundary.

Bt5—52 to 67 inches; light red (2.5YR 6/6) silty clay loam, red (2.5YR 4/8) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; few fine tubular pores; few thin clay films on peds and in pores; strongly acid (pH 5.2); clear wavy boundary.

Bt6—67 to 87 inches; reddish yellow (5YR 6/6) silty clay loam, strong brown (7.5YR 5/6) moist; moderate medium angular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular pores; common thin clay films on peds and many thick clay films in pores; strongly acid (pH 5.2); gradual irregular boundary.

Bt7—87 to 96 inches; reddish yellow (5YR 6/6) silty clay loam, yellowish red (5YR 4/6) moist; many fine stains of yellowish red (5YR 5/6) silty clay loam; strong moderate angular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; common moderately thick clay films in pores; strongly acid (pH 5.2); clear wavy boundary.

Bt8—96 to 99 inches; pink (5YR 8/4) silt loam with common fine stains of reddish yellow (5YR 6/6) loam; reddish yellow (5YR 6/6) with common fine stains of yellowish red (5YR 5/6) moist; strong medium angular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; common moderately thick clay films in pores; strongly acid (pH 5.2); clear irregular boundary.

Cr—99 inches; tuffaceous metasediments; the upper 4 inches breaks into thick platy blocks; fractures are 4 to 6 inches apart; can be dug with a spade, broken in hands, and scratched with a fingernail; nearly all fragments slake in water.

The depth to paralithic contact is more than 60 inches. The iron oxide plus gibbsite to clay ratio is more than 20 percent within the textural control section. The upper part of the argillic horizon has more than 0.9 percent organic carbon.

The A horizon has dry color of 7.5YR 5/4, 5/6, or 6/4 or 5YR 6/6. Moist color is 7.5YR 3/4, 4/4, or 5/6; 5YR 4/4, 3/6, 4/8, or 5/8; or 2.5YR 3/4, 3/6, or 4/6. The texture is gravelly loam or gravelly clay loam. The content of clay ranges from 20 to 30 percent. The content of rock fragments, mostly gravel, ranges from 15 to 25 percent. Reaction is slightly acid or moderately acid. Base saturation ranges from 20 to 30 percent.

The Bt horizon has dry color of 7.5YR 6/6; 5YR 5/4, 6/4, 5/6, 6/6, 5/8, 6/8, or 8/4; or 2.5YR 4/6, 4/8, 5/8, or 6/6. Moist color is 7.5YR 4/4 or 5/6; 5YR 4/4, 3/6, 4/6, 4/8, 5/6, 6/6, or 5/8; or 2.5YR 3/4, 3/6, 4/6, or 4/8. The content of clay ranges from 35 to 50 percent in the upper part and from 20 to 35 percent in

the lower part. The content of rock fragments, mostly gravel, ranges from 0 to 15 percent. Reaction is moderately acid or strongly acid. Base saturation ranges from 5 to 20 percent.

Kilarc Series

The Kilarc series consists of deep, well drained soils that formed in material weathered from weakly consolidated sandstone. These soils are on mountains. Slopes range from 2 to 50 percent. The mean annual precipitation is 30 to 65 inches, and the mean annual temperature is 52 to 54 degrees F.

Taxonomic classification: Fine, mixed, superactive, mesic Mollic Palexeralfs

Typical Pedon

Kilarc gravelly silt loam, 2 to 15 percent slopes, about 2 miles northwest of Big Bend; 1,900 feet north and 700 feet east of the southwest corner of sec. 24, T. 37 N., R. 1 W., Big Bend SW (Big Bend) quadrangle (7.5 minute series):

A—0 to 7 inches; grayish brown (10YR 5/2) gravelly silt loam, very dark grayish brown (10YR 3/2) moist; strong fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine interstitial pores; 25 percent gravel and 5 percent cobbles; slightly acid (pH 6.1); abrupt smooth boundary.

Bt1—7 to 15 inches; light brownish gray (10YR 6/2) clay, brown (7.5YR 4/3) moist; strong coarse prismatic structure parting to moderate fine angular blocky; very hard, firm, sticky and plastic; common very fine and roots; common very fine tubular pores; common moderately thick clay films on peds and in pores; 10 percent gravel; extremely acid (pH 4.5); clear smooth boundary.

Bt2—15 to 24 inches; pale brown (10YR 6/3) clay, brown (7.5YR 4/4) moist; strong medium prismatic structure parting to moderate fine angular blocky; very hard, firm, sticky and plastic; few fine and medium roots; few very fine tubular pores; 10 percent gravel; very strongly acid (pH 4.9); abrupt smooth boundary.

Bt3—24 to 32 inches; pale brown (10YR 6/3) gravelly sandy clay, brown (10YR 4/3) moist; moderate medium angular blocky structure; extremely hard, very firm, very sticky and plastic; few fine and medium roots; common very fine tubular pores; 25 percent gravel; very strongly acid (pH 4.9); clear smooth boundary.

Bt4—32 to 50 inches; pale brown (10YR 6/3) gravelly sandy clay, brown (10YR 4/3) moist; moderate medium subangular blocky structure; very hard, very firm, very sticky and plastic; few very fine and fine roots; common very fine and fine pores; 30 percent gravel; very strongly acid (pH 5.0); abrupt smooth boundary.

Cr—50 inches; soft sandstone.

The depth to soft sandstone ranges from 40 to 60 inches. The particle-size control section (7 to 27 inches) ranges from 40 to 60 percent clay and from 5 to 30 percent rock fragments, mostly gravel.

The A horizon has dry color of 10YR 5/2 or 5/4. Moist color is 10YR 3/2 or 3/3. The content of clay ranges from 15 to 25 percent. The content of rock fragments, mostly gravel or cobbles, ranges from 15 to 35 percent.

The Bt horizon has dry color of 10YR 5/4, 6/2, 6/3, or 6/4. Moist color is 10YR 4/3 or 4/4 or 7.5YR 4/3 or 4/4. The content of clay ranges from 50 to 60 percent. The content of rock fragments, mostly gravel, ranges from 5 to 30 percent.

Kindig Series

The Kindig series consists of deep, well drained soils that formed in material weathered from metamorphic rock. These soils are on mountains. Slopes range from 15 to 75 percent. The mean annual precipitation is 40 to 60 inches, and the mean annual temperature is 45 to 50 degrees F.

Taxonomic classification: Loamy-skeletal, mixed, active, mesic Dystric Xerochrepts

Typical Pedon

Kindig gravelly sandy loam, in an area of Kindig-Neuns complex, 30 to 50 percent slopes, about 3.5 miles southwest of McCloud, 2 miles south of Snowman Hill Road; 100 feet west of Upper Soda Creek Road; 1,900 feet east and 1,400 feet south of the northwest corner of sec. 16, T. 39 N., R. 3 W., Shoeinhorse Mountain NW (Girard Ridge) quadrangle (7.5 minute series):

Oi—1 inch to 0; new and partially decomposed needles, leaves, twigs, and other organic debris.

A1—0 to 2 inches; very dark grayish brown (10YR 3/2) gravelly sandy loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine interstitial pores; 25 percent gravel; moderately acid (pH 5.8); abrupt smooth boundary.

A2—2 to 8 inches; light brown (7.5YR 6/4) gravelly sandy loam, reddish brown (5YR 4/4) moist;

moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and many fine and medium roots; many very fine interstitial pores; 30 percent gravel and 5 percent cobbles; moderately acid (pH 5.9); abrupt smooth boundary.

Bt1—8 to 14 inches; light brown (7.5YR 6/4) very gravelly sandy loam, reddish brown (5YR 4/4) moist; moderate fine and medium subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine and fine and many medium roots; common very fine tubular and interstitial and common fine tubular pores; 30 percent gravel and 20 percent cobbles; moderately acid (pH 5.9); abrupt wavy boundary.

Bt2—14 to 32 inches; light brown (7.5YR 6/4) very cobbly loam, reddish brown (5YR 5/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common fine and few medium roots; common very fine and fine tubular pores; 30 percent gravel and 25 percent cobbles; moderately acid (pH 5.7); gradual irregular boundary.

Bt3—32 to 49 inches; light brown (7.5YR 6/4) very cobbly loam, reddish brown (5YR 5/4) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few fine roots; few fine tubular pores; 25 percent gravel and 30 percent cobbles; moderately acid (pH 5.6); diffuse irregular boundary.

Cr—49 inches; highly fractured, weathered shale.

The depth to paralithic contact ranges from 40 to 60 inches. Base saturation ranges from 40 to 60 percent.

The A horizon has dry color of 10YR 3/2, 4/2, 5/2, 5/4, 6/3, or 6/4 or 7.5YR 5/2, 5/4, or 6/4. Moist color is 10YR 2/2, 3/2, or 3/4; 7.5YR 4/4; or 5YR 4/4. The content of rock fragments, mostly gravel, ranges from 20 to 35 percent.

The Bt horizon has dry color of 10YR 6/3 or 6/4 or 7.5YR 6/4. Moist color is 10YR 4/4; 7.5YR 4/4 or 5/6; or 5YR 4/4, 5/4, or 5/6. The texture is very gravelly sandy loam, very gravelly loam, very cobbly loam, or very cobbly sandy loam. The content of rock fragments ranges from 35 to 60 percent.

The C horizon has colors similar to those of the Bt horizon. In some pedons, the C horizon contains 50 to 70 percent rock fragments. Many of the fragments are highly weathered.

Lassen Series

The Lassen series consists of moderately deep, well drained soils that formed in alluvium derived from extrusive igneous rock. These soils are on plateaus. Slopes range from 2 to 15 percent. The mean annual precipitation is 12 to 16 inches, and the mean annual temperature is 45 to 50 degrees F.

Taxonomic classification: Fine, smectitic, mesic Leptic Haploxererts

Typical Pedon

Lassen cobbly clay, in an area of Lassen-Cuppy complex, 2 to 15 percent slopes, about 3.8 miles east of the Dixie Ranch Headquarters on Dixie Ranch Road, 50 feet north of the road on a south-facing slope; 20 feet north and 1,320 feet east of the center of sec. 13, T. 35 N., R. 8 E., Little Valley NE (Dixie Peak) quadrangle (7.5 minute series):

A—0 to 2 inches; dark brown (10YR 3/3) cobbly clay, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; slightly hard, friable, very sticky and very plastic; common very fine roots; many very fine interstitial pores; 20 percent cobbles; neutral (pH 7.3); clear smooth boundary.

Ass—2 to 13 inches; dark grayish brown (10YR 4/2) clay, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium angular blocky; hard, firm, very sticky and very plastic; common very fine roots; many very fine interstitial pores; continuous thin pressure faces and slickensides; 10 percent cobbles; neutral (pH 7.3); abrupt smooth boundary.

Bss—13 to 28 inches; brown (10YR 5/3) clay, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium angular blocky; hard, firm, very sticky and very plastic; many very fine roots; many very fine interstitial and few coarse tubular pores; continuous thin pressure faces and slickensides; moderately alkaline (pH 8.0); abrupt smooth boundary.

2R—28 inches; hard basalt.

The depth to lithic contact ranges from 20 to 40 inches. Cracks $^{1}/_{2}$ inch to 2 inches wide extend to a depth of 20 to 24 inches when the soil is dry from July through October (125 days). Few or common intersecting slickensides are in the Ass and Bss horizons.

The A and Ass horizons have dry color of 10YR 3/3, 4/3, 4/2, 5/3, or 5/2 or 7.5YR 4/2. Moist color is 10YR 3/3 or 3/2. The content of clay ranges from 40 to 50 percent. The content of rock fragments, mostly cobbles or gravel, ranges from 5 to 25 percent. The content of rock fragments on the surface, mostly cobbles, ranges from 0 to 15 percent.

The Bss horizon has dry color of 10YR 5/3 or 7.5YR 4/2. Moist color is 10YR 3/3 or 7.5YR 3/2. The content of clay ranges from 40 to 50 percent. The content of rock fragments, mostly gravel or cobbles, ranges from 0 to 5 percent.

Lasvar Series

The Lasvar series consists of moderately deep, somewhat poorly drained soils that formed in alluvium derived from extrusive igneous rock. These soils are in basins and drainageways. Slopes range from 0 to 2 percent. The mean annual precipitation is 16 to 25 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Fine, smectitic, mesic Aquic Durixererts

Typical Pedon

Lasvar clay, in an area of Burman-Lasvar complex, 0 to 2 percent slopes, about 9.4 miles northwest of Lookout; 1,600 feet east and 500 feet south of the northwest corner of sec. 15, T. 40 N., R. 6 E., Whitehorse SE (Egg Lake) quadrangle (7.5 minute series):

Ass—0 to 3 inches; grayish brown (10YR 5/2) clay, brown (10YR 4/3) moist; common very fine distinct dark gray (N 4/0) iron depletions, black (N 2/0) moist; moderate fine subangular blocky structure; very hard, very firm, sticky and plastic; common fine roots; few very fine tubular pores; 5 percent manganese nodules; common intersecting slickensides; neutral (pH 7.0); abrupt smooth boundary.

Bss—3 to 28 inches; brown (10YR 5/3) clay, brown (10YR 4/3) moist; common very fine distinct dark gray (N 4/0) iron depletions, black (N 2/0) moist; strong coarse prismatic structure parting to moderate coarse angular blocky; extremely hard, extremely firm, sticky and plastic; few very fine and fine roots; few very fine tubular pores; 5 percent manganese nodules; common intersecting slickensides; moderately alkaline (pH 8.0); abrupt smooth boundary.

2Bq—28 to 31 inches; very pale brown (10YR 7/4), weakly cemented silt loam, dark yellowish brown (10YR 4/4) moist; common very fine distinct dark gray (N 4/0) iron depletions, black (N 2/0) moist; moderate very thin platy structure parting to moderate angular blocky; very firm, slightly sticky and slightly plastic; common very fine roots; few very fine tubular pores; 5 percent manganese nodules; moderately alkaline (pH 8.0); abrupt smooth boundary.

2Bqm—31 to 60 inches; very pale brown (10YR 7/4), continuously indurated duripan, dark yellowish brown (10YR 4/4) moist.

Depth to the duripan ranges from 20 to 40 inches. The particle-size control section (10 to 31 inches) averages 40 to 46 percent clay. Surface cracks are $^1/_2$ inch to 2 inches wide and extend to a depth of 20 to 25 inches. Even though the soil is moist in some part, the cracks are open for at least 60 days.

The Ass horizon has dry color of 10YR 4/2 or 5/2 or 7.5YR 4/2 or 5/2. Moist color is 10YR 3/2 or 4/3 or 7.5YR 3/2 or 4/2. The content of clay ranges from 45 to 55 percent. The content of organic matter is 1 to 2 percent.

The Bss horizon has dry color of 10YR 4/2, 5/2, or 5/3 or 7.5YR 4/2. Moist color is 10YR 3/2 or 4/3 or 7.5YR 3/2. The content of clay ranges from 45 to 55 percent. Reaction is neutral or slightly alkaline.

The 2Bq horizon has dry color of 10YR 5/3, 6/3, or 7/4. Moist color is 10YR 4/4 or 7.5YR 3/4, 4/4, or 5/4. The texture is silt loam or silty clay loam. The content of clay ranges from 25 to 35 percent.

Longbell Series

The Longbell series consists of very deep, somewhat excessively drained soils that formed in tephra deposited over volcanic outwash. These soils are on lava plateaus. Slopes range from 2 to 15 percent. The mean annual precipitation is 16 to 25 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Medial over sandy or sandy-skeletal, mixed, mesic Humic Vitrixerands

Typical Pedon

Longbell gravelly coarse sandy loam, 2 to 15 percent slopes, about 1.2 miles north of Longbell Fire Station, 200 feet east of logging road; 1,000 feet west and 1,400 feet south of the northeast corner of sec. 17, T. 42 N., R. 5 E., Whitehorse NW (Border Mountain) quadrangle (7.5 minute series):

Oi—2 inches to 0; recent and decomposed pine needles.

A1—0 to 3 inches; brown (10YR 5/3) gravelly coarse sandy loam, very dark grayish brown (10YR 3/2)

moist; weak very fine subangular blocky structure; loose, nonsticky and nonplastic; many very fine roots; common very fine interstitial pores; 20 percent fine gravel; slightly acid (pH 6.5); abrupt smooth boundary.

A2—3 to 11 inches; brown (10YR 5/3) gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure; soft, loose, nonsticky and nonplastic; common very fine and few coarse and medium roots; common very fine interstitial pores; 20 percent fine gravel; slightly acid (pH 6.5); clear smooth boundary.

Bw1—11 to 18 inches; pale brown (10YR 6/3) gravelly loamy coarse sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; few fine and coarse roots; common very fine interstitial pores; 20 percent fine gravel; neutral (pH 7.0); abrupt smooth boundary.

2Bw2—18 to 30 inches; pale brown (10YR 6/3) gravelly loamy coarse sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; few medium and coarse roots; common very fine interstitial pores; 20 percent fine gravel; neutral (pH 7.0); clear smooth boundary.

2Bw3—30 to 42 inches; pale brown (10YR 6/3) gravelly loamy sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; few medium roots; common very fine interstitial pores; 20 percent gravel; neutral (pH 7.0); clear smooth boundary.

2C1—42 to 52 inches; very pale brown (10YR 7/3) very gravelly sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; few medium roots; common fine interstitial pores; 40 percent fine gravel; neutral (pH 7.0); gradual smooth boundary.

2C2—52 to 54 inches; very pale brown (10YR 7/3) very gravelly sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; few fine roots; common fine interstitial pores; 50 percent fine cinder gravel; neutral (pH 7.0); abrupt smooth boundary.

2C3—54 to 72 inches; very pale brown (10YR 7/3) very gravelly sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; few fine roots; common fine interstitial pores; 50 percent fine cinder gravel; neutral (pH 7.0).

The particle-size control section (0 to 40 inches) ranges from 3 to 18 percent clay and from 15 to 30 percent rock fragments, mostly fine gravel. Reaction is slightly acid or neutral.

The A horizon has dry color of 10YR 5/2 or 5/3. Moist color is 10YR 3/2, 3/3, or 4/2. The content of organic matter ranges from 2 to 3 percent. The content of rock fragments, mostly gravel, ranges from 15 to 30 percent. NaF pH is 10.0 to 10.5. Base saturation by ammonium acetate ranges from 34 to 38 percent.

The Bw1 horizon has dry color of 10YR 6/3, 6/4, or 7/3. Moist color is 10YR 4/3 or 4/4. The content of organic matter is 0.6 to 1.0 percent. The content of rock fragments, mostly gravel, ranges from 15 to 30 percent. NaF pH is 9.6 to 10.0. Base saturation by ammonium acetate ranges from 40 to 50 percent.

The 2Bw horizon has dry color of 10YR 6/3, 6/4, or 7/3. Moist color is 10YR 4/3 or 4/4. The content of organic matter is 0.3 to 0.5 percent. The content of clay ranges from 3 to 5 percent. The content of rock fragments, mostly gravel, ranges from 15 to 30 percent. NaF pH is 9.6 to 10.0. Base saturation by ammonium acetate ranges from 40 to 60 percent.

The C horizon has dry color of 10YR 6/3, 6/4, 7/3, or 7/4. Moist color is 10YR 5/3, 4/3, or 4/4. The content of organic matter is 0.1 to 0.3 percent. The content of clay ranges from 2 to 5 percent. The content of rock fragments, mostly gravel, ranges from 35 to 60 percent. NaF pH is 7.7 to 8.5. Base saturation by ammonium acetate ranges from 50 to 80 percent.

Longbilly Series

The Longbilly series consists of very deep, moderately well drained soils that formed in alluvium derived from extrusive igneous rock and lake sediments. These soils are on stream terraces. Slopes range from 0 to 2 percent. The mean annual precipitation is 14 to 16 inches, and the mean annual temperature is 48 to 50 degrees F.

Taxonomic classification: Fine, smectitic, mesic Typic Natrixeralfs

Typical Pedon

Longbilly silt loam, in an area of Longbilly-Pit complex, 0 to 2 percent slopes, about 3.5 miles north of Bieber, 200 feet south of dirt road on BLM property; 2,650 feet north and 400 feet east of the southwest corner of sec. 34, T. 39 N., R. 7 E., Bieber NW (Lookout) quadrangle (7.5 minute series):

E—0 to 1 inch; light gray (10YR 7/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate thin platy structure; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; common very fine tubular and few very fine vesicular pores; very slightly effervescent and disseminated; moderately alkaline (pH 7.9); abrupt smooth boundary.

Btn1—1 to 4 inches; light brownish gray (10YR 6/2)

silt loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; very hard, friable, sticky and plastic; few thin clay films in pores; few very fine roots throughout and few coarse roots between peds; many very fine tubular pores; violently effervescent and disseminated; strongly alkaline (pH 8.8); abrupt wavy boundary.

Btn2—4 to 7 inches; grayish brown (10YR 5/2) silty clay loam, dark brown (10YR 3/3) moist; strong very fine angular blocky structure; very hard, friable, sticky and plastic; few thin clay films in pores; common very fine roots; common very fine tubular pores; violently effervescent and disseminated; very strongly alkaline (pH 9.5); abrupt wavy boundary.

Btkn1—7 to 12 inches; grayish brown (10YR 5/2) silty clay, very dark grayish brown (10YR 3/2) moist; strong very fine angular blocky structure; very hard, friable, sticky and plastic; few moderately thick clay films in pores; common very fine roots throughout and few coarse roots between peds; few very fine tubular pores; common segregated fine irregular soft masses; violently effervescent; very strongly alkaline (pH 9.9); clear wavy boundary.

Btkn2—12 to 22 inches; dark grayish brown (10YR 4/2) silty clay, dark brown (10YR 3/3) moist; weak fine prismatic structure parting to strong fine angular blocky; very hard, friable, sticky and plastic; common moderately thick clay films in pores and on peds; common very fine roots throughout and few medium roots between peds; few very fine tubular pores; common segregated fine irregular masses of lime; violently effervescent; very strongly alkaline (pH 10.0); clear wavy boundary.

Btkn3—22 to 34 inches; brown (10YR 5/3) silty clay, dark brown (10YR 3/3) moist; weak fine prismatic structure parting to strong fine angular blocky; hard, friable, sticky and plastic; many moderately thick clay films in pores and on peds; common very fine roots throughout and few medium roots between peds; few very fine tubular pores; common fine irregular masses; violently effervescent; very strongly alkaline (pH 9.7); clear wavy boundary.

Btkn4—34 to 43 inches; dark grayish brown (10YR 4/2) silty clay loam, dark brown (10YR 3/3) moist; weak fine prismatic structure parting to strong very fine angular blocky; hard, friable, sticky and plastic; many moderately thick clay films in pores and on peds; few very fine roots between peds and few fine roots between peds; few very fine tubular pores; many segregated fine irregular soft masses; violently effervescent; very strongly alkaline (pH 9.3); clear wavy boundary.

Btkn5—43 to 54 inches; gray (10YR 5/1) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak fine prismatic structure parting to strong very fine angular blocky; hard, friable, sticky and plastic; many moderately thick clay films in pores and on peds; few very fine and fine roots between peds; few very fine tubular pores; common segregated fine irregular soft masses; very slightly effervescent; very strongly alkaline (pH 9.1); abrupt wavy boundary.

2Btkn6—54 to 60 inches; light yellowish brown (10YR 6/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, sticky and slightly plastic; many moderately thick clay films in pores; few very fine and fine roots throughout; few very fine tubular pores; common segregated fine irregular soft masses; very slightly effervescent; very strongly alkaline (pH 9.1).

The depth to mixed alluvial deposits ranges from 40 to more than 60 inches. The electrical conductivity in most profiles is less than 2 millimhos per centimeter on the surface and increases to 2 to 4 millimhos per centimeter within a depth of 20 inches. The SAR is 15 to 45 throughout.

The E horizon has dry color of 10YR 6/2 or 7/2. Moist color is 10YR 4/2 or 3/4. Reaction is moderately alkaline or strongly alkaline.

The upper part of the Bt horizon has dry color of 10YR 5/2 or 6/2. Moist color is 10YR 3/3 or 3/2. The texture is silt loam or silty clay loam. The content of clay ranges from 15 to 35 percent.

The lower part of the Bt horizon has dry color of 10YR 4/2, 5/1, 5/2, 5/3, 6/3, or 6/4. Moist color is 10YR 3/2, 3/3, 4/3, or 4/4. The content of clay ranges from 35 to 50 percent. From a depth of 40 to 60 inches, the texture is sandy clay loam or clay loam with 25 to 35 percent clay. Reaction is strongly alkaline or very strongly alkaline.

Longcreek Series

The Longcreek series consists of shallow, well drained soils that formed in slope alluvium derived from extrusive igneous rock. These soils are on lava plateaus, hills, and mountains. Slopes range from 2 to 30 percent. The mean annual precipitation is 12 to 16 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Clayey-skeletal, smectitic, mesic Lithic Argixerolls

Typical Pedon

Longcreek very cobbly loam, in an area of Jellycamp-Lassen-Longcreek complex, 2 to 15 percent slopes, about 1.75 miles south of the intersection of Hayden Hill Road and Silva Flat Reservoir Road, and 20 feet west of dirt road; approximately 2,000 feet north and 1,500 feet east of the southwest corner of sec. 7, T. 36 N., R. 10 E., Hayden Hill NE (Said Valley) quadrangle (7.5 minute series):

A—0 to 3 inches; dark (10YR 4/3) very cobbly loam, very dark brown (10YR 2/2) moist; weak very fine and fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine tubular pores; 10 percent gravel, 40 percent cobbles, 5 percent stones; slightly acid (pH 6.2); clear wavy boundary.

Bt—3 to 16 inches; brown (7.5YR 4/4) very cobbly clay loam, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; many very fine and common fine roots; common very fine and few fine tubular pores; common thin clay films on peds and in pores; 10 percent gravel, 45 percent cobbles, 5 percent stones; neutral (pH 6.2); clear wavy boundary.

R—16 inches; fractured and tilted, flaggy basalt; cracks $^1/_8$ to $^1/_4$ inch apart; very little soil in cracks.

The depth to lithic contact ranges from 14 to 20 inches. The particle-size control section (3 to 16 inches) ranges from 35 to 50 percent clay and from 45 to 60 percent rock fragments, mostly cobbles and stones. Reaction is neutral or slightly acid. Base saturation by ammonium acetate ranges from 90 to 100 percent. The content of rock fragments on the surface, mostly cobbles, ranges from 50 to 60 percent.

The A horizon has dry color of 10YR 4/3, 5/3, or 5/4. Moist color is 10YR 3/3, 3/2, or 2/2. The content of organic matter ranges from 2 to 4 percent. The content of clay ranges from 12 to 25 percent. The content of rock fragments, mostly cobbles or stones, ranges from 45 to 60 percent.

The Bt horizon has dry color of 7.5YR 4/4, 5/3, or 5/4. Moist color is 5YR 3/3 or 3/2. The content of organic matter ranges from 2 to 4 percent. The content of clay ranges from 35 to 50 percent. The content of rock fragments, mostly cobbles or stones, ranges from 45 to 60 percent.

Lonkey Series

The Lonkey series consists of moderately deep, well drained soils that formed in alluvium derived from extrusive igneous rock. These soils are on hills and plateaus. Slopes range from 2 to 30 percent. The mean annual precipitation is 14 to 20 inches, and the mean annual temperature is 45 to 50 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Pachic Argixerolls

Typical Pedon

Lonkey cobbly sandy loam, in an area of Lonkey-Malinda complex, 15 to 30 percent slopes, about 10 miles southeast of Adin on Highway 139, 1.25 miles east on BLM road, 500 feet east of the road (uphill); 200 feet east and 1,800 feet south of the northwest corner of sec. 8, T. 37 N., R. 10 E., Adin SE (Lane Reservoir) quadrangle (7.5 minute series):

A—0 to 4 inches; gray (10YR 5/1) cobbly sandy loam, very dark gray (10YR 3/1) moist; moderate fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; 10 percent gravel and 15 percent cobbles; neutral (pH 7.0); abrupt smooth boundary.

Bt1—4 to 9 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky and slightly plastic; common very fine roots; common very fine tubular pores; few thin clay films in pores; 10 percent gravel; neutral (pH 7.0); clear smooth boundary.

Bt2—9 to 14 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; common thin clay films in pores; 10 percent gravel; neutral (pH 7.0); abrupt smooth boundary.

Bt3—14 to 19 inches; dark brown (10YR 4/3) gravelly clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few very fine roots; common fine tubular pores; common moderately thick clay films on faces of peds and common thin clay films in pores; 30 percent gravel; neutral (pH 7.0); clear smooth boundary.

Bt4—19 to 24 inches; dark yellowish brown (10YR 4/4) gravelly clay, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; many very fine tubular pores; 30 percent gravel; neutral (pH 7.0); abrupt smooth boundary.

R—24 inches; hard conglomerate tuff; silica-cemented cap 1/16 inch thick.

The depth to lithic contact ranges from 20 to 40 inches. The particle-size control section averages 25 to 35 percent clay and 5 to 30 percent rock fragments, mostly gravel. The content of rock fragments on the surface, mostly cobbles, ranges from 15 to 35 percent. Base saturation by sum of cations ranges from 95 to 100 percent throughout. The content of organic matter ranges from 2 to 4 percent to a depth of 20 inches.

The A horizon has dry color of 10YR 5/1, 5/2, or 4/2. Moist color is 10YR 3/1, 3/2, or 2/1. The texture is loam, gravelly sandy loam, or cobbly sandy loam. The content of clay ranges from 15 to 27 percent. The content of rock fragments, mostly gravel or cobbles, ranges from 0 to 35 percent.

The Bt1 and Bt2 horizons have dry color of 10YR 4/1, 4/2, 4/3, or 5/2. Moist color is 10YR 2/1, 3/1, or 3/2 or 7.5YR 3/2. The texture is sandy clay loam, loam, gravelly sandy clay loam, or clay loam. The content of clay ranges from 20 to 30 percent. The content of rock fragments, mostly gravel, ranges from 0 to 30 percent.

The Bt3 and Bt4 horizons have dry color of 10YR 4/2, 4/3, 4/4, 5/3, or 5/4. Moist color is 10YR 3/2, 3/3, or 4/3 or 7.5YR 3/2, 3/4, or 4/2. The texture is gravelly sandy clay loam, clay loam, or clay. The content of clay ranges from 27 to 50 percent. The content of rock fragments, mostly gravel, ranges from 0 to 30 percent.

The Lonkey soils in map units 236 and 270 have a paralithic contact, which is not defined for the series. This difference, however, does not affect use or management of the soils.

Loveness Series

The Loveness series consists of very deep, well drained soils that formed in tephra. These soils are on lava plateaus and hills. Slopes range from 2 to 30 percent. The mean annual precipitation is 16 to 25 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Ultic Palexerolls

Typical Pedon

Loveness sandy loam, in an area of Loveness-Fleener complex, 2 to 15 percent slopes, about 20 miles north of Lookout on Lookout-Hackamore Road; 0.3 mile southwest on Loveness Road, 100 feet south of the road; 2,500 feet west and 1,100 feet north of the southeast corner of sec. 21, T. 42 N., R. 7 E., Crank Mountain NW (Crank Mountain) quadrangle (7.5 minute series):

Oi—1 inch to 0; recent and partially decomposed pine needles and small twigs.

A1—0 to 7 inches; dark brown (7.5YR 4/2) sandy loam, dark reddish brown (5YR 3/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; common fine and medium roots; common very fine tubular pores; 10 percent gravel; slightly acid (pH 6.5); abrupt smooth boundary.

A2—7 to 12 inches; reddish brown (5YR 4/4) loam, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky and slightly plastic; common medium and coarse roots; common very fine tubular pores; 10 percent gravel; slightly acid (pH 6.5); clear smooth boundary.

2Bt1—12 to 19 inches; reddish brown (5YR 4/4) gravelly loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common medium and coarse roots; common fine and many very fine tubular pores; few thin clay films in pores; 15 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); abrupt smooth boundary.

2Bt2—19 to 26 inches; yellowish red (5YR 4/6) gravelly clay loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common medium and coarse roots; common very fine tubular pores; common thin clay films in pores; 15 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); abrupt smooth boundary.

2Bt3—26 to 35 inches; strong brown (7.5YR 4/6) gravelly clay loam, dark reddish brown (5YR 3/4) moist; weak medium angular blocky structure; very hard, firm, slightly sticky and slightly plastic; common medium and coarse roots; common very fine tubular pores; common thin clay films in pores; 15 percent gravel and 10 percent cobbles; NaF pH 8.4; slightly acid (pH 6.5); gradual smooth boundary.

3Bt4—35 to 60 inches; strong brown (7.5YR 5/6) extremely stony clay loam, reddish brown (5YR 4/4) moist; weak medium angular blocky structure; very hard, firm, slightly sticky and slightly plastic; common medium roots; common very fine tubular pores; common moderately thick clay films in pores; 65 percent stones; NaF pH 8.4; slightly acid (pH 6.5).

The depth to bedrock is more than 60 inches. The depth to stones or boulders ranges from 35 to 55 inches. The particle-size control section (12 to 32 inches) ranges from 27 to 35 percent clay. The content of rock fragments ranges from 15 to 25 percent. The content of rock fragments on the surface, mostly gravel, ranges from 5 to 25 percent. The content of organic matter ranges from 1 to 5 percent to a depth of 12 inches. Base saturation ranges from 50 to 65 percent to a depth of 30 inches.

The A horizon has dry color of 7.5YR 4/2, 4/4, or 5/4 or 5YR 4/2, 4/4, or 5/4. Moist color is 7.5YR 3/2 or 5YR 3/2 or 3/3. The content of clay ranges from 15 to 20 percent. The content of rock fragments, mostly gravel, ranges from 5 to 10 percent. Reaction is slightly acid or neutral. NaF pH ranges from 8.8 to 9.6.

The BA horizon has dry color of 7.5YR 4/4 or 4/2 or 5YR 4/4. Moist color is 7.5YR 3/2 or 5YR 3/3. The content of organic matter is 1 to 2 percent. The content of clay ranges from 18 to 23 percent. The content of rock fragments, mostly gravel, ranges from 5 to 10 percent. Reaction is slightly acid or neutral. NaF pH ranges from 8.4 to 8.6.

The 2Bt horizon has dry color of 5YR 4/4 or 4/6 or 7.5YR 4/4, 5/4, or 5/6. Moist color is 5YR 3/4 or 4/4. The content of organic matter is 0.5 to 1.0 percent. The texture is loam, clay loam, or sandy clay loam. The content of clay ranges from 23 to 35 percent. The content of rock fragments, mostly gravel and cobbles, ranges from 20 to 30 percent. Reaction is slightly acid or neutral. NaF pH ranges from 8.2 to 8.4.

The 3Bt horizon has dry color of 7.5YR 4/4, 5/4, or 5/6. Moist color is 5YR 3/4 or 4/4. The content of clay ranges from 27 to 35 percent. The content of rock fragments, mostly stones or boulders, ranges from 40 to 70 percent. Reaction is slightly acid or neutral. NaF pH ranges from 8.2 to 8.4.

Lunsford Series

The Lunsford series consists of very deep, somewhat poorly drained soils that formed in mixed alluvium derived from sedimentary and extrusive igneous rock. These soils are on stream terraces. Slopes range from 0 to 2 percent. The mean annual precipitation is 14 to 16 inches, and the mean annual temperature is 48 to 50 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Aquic Haploxerolls

Typical Pedon

Lunsford loam, 0 to 2 percent slopes, approximately 3.1 miles southwest of Adin; about 700 feet west and 1,900 feet north of the southeast corner of sec. 8, T. 38 N., R. 9 E., Adin NW (Adin) quadrangle (7.5 minute series):

Ap1—0 to 4 inches; gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; moderate fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many fine and medium roots; common very fine tubular pores; violently effervescent; strongly alkaline (pH 8.6); abrupt smooth boundary.

Ap2—4 to 7 inches; gray (10YR 5/1) loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many fine and medium roots; common very fine tubular pores; violently effervescent; strongly alkaline (pH 8.7); abrupt smooth boundary.

Ap3—7 to 13 inches; gray (10YR 5/1) loam, very dark grayish brown (10YR 3/2) moist; moderate medium platy structure; slightly hard, friable, nonsticky and slightly plastic; common very fine and fine roots; common very fine tubular pores; violently effervescent; moderately alkaline (pH 8.4); abrupt smooth boundary.

Bt1—13 to 20 inches; light gray (10YR 7/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate fine subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; few fine roots; many fine tubular pores; few thin clay films in pores; violently effervescent; moderately alkaline (pH 8.3); clear smooth boundary.

Bt2—20 to 29 inches; light gray (10YR 7/2) sandy clay loam, brown or dark brown (10YR 4/3) moist; massive; hard, firm, nonsticky and slightly plastic; few fine roots; many fine tubular pores; few thin clay films in pores; violently effervescent; moderately alkaline (pH 8.1); clear smooth boundary.

Bq1—29 to 36 inches; white (10YR 8/1) sandy clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine roots; many very fine and common fine and medium tubular pores; 5 percent durinodes; secondary silica in pores; very slightly

effervescent; moderately alkaline (pH 7.9); clear smooth boundary.

Bq2—36 to 49 inches; white (10YR 8/1) sandy clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, firm, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; very slightly effervescent; slightly alkaline (pH 7.8); clear smooth boundary.

Bq3—49 to 55 inches; white (10YR 8/1) sandy clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, firm, slightly sticky and slightly plastic; few very fine roots; many very fine and common fine and medium tubular pores; weakly cemented discontinuous matrix with 20 percent strongly cemented durinodes; very slightly effervescent; slightly alkaline (pH 7.8); clear wavy boundary.

C—55 to 72 inches; white (10YR 8/1) sandy clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, firm, slightly sticky and slightly plastic; many very fine and common fine and medium tubular pores; very slightly effervescent; slightly alkaline (pH 7.8).

The content of clay in the particle-size control section ranges from 18 to 25 percent.

The Ap horizon has dry color of 10YR 4/1 or 5/1. The content of clay ranges from 15 to 20 percent. The content of organic matter ranges from 4 to 7 percent. Calcium carbonate equivalent ranges from 10 to 15 percent. Electrical conductivity ranges from 0.7 to 1.5 millimhos per centimeter. Exchangeable sodium ranges from 4 to 7 percent.

The Bt horizon has dry color of 10YR 6/2, 7/2, or 7/3. Moist color is 10YR 3/2, 4/2, 4/3, 5/2, or 5/3. The content of clay ranges from 20 to 25 percent. The content of organic matter ranges from 2 to 3 percent. Calcium carbonate equivalent ranges from 2 to 11 percent. Electrical conductivity is less than 1.0 millimho per centimeter. Exchangeable sodium is 4 to 15 percent.

The Bq horizon has dry color of 10YR 7/3, 8/1, or 8/2. Moist color is 10YR 5/3 or 2.5Y 5/2. The texture is stratified sandy clay loam to silty clay loam. The content of clay ranges from 25 to 30 percent.

Malinda Series

The Malinda series consists of shallow, well drained soils that formed in slope alluvium derived from extrusive igneous rock. These soils are on lava plateaus, hills, and summits. Slopes range from 2 to 50 percent. The mean annual precipitation is 16 to 20 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Loamy, mixed, superactive, mesic Lithic Argixerolls

Typical Pedon

Malinda very gravelly sandy loam, in an area of Lonkey-Malinda complex, 15 to 30 percent slopes, about 8.1 miles southeast of Adin, 3.1 miles southeast on Butte Creek Road, 3 miles south on dirt road that follows Butte Creek, 1 mile west on dirt road (uphill); 300 feet east and 300 feet north of the southwest corner of sec. 31, T. 38 N., R. 10 E., Adin SE (Lane Reservoir) quadrangle (7.5 minute series):

A—0 to 2 inches; grayish brown (10YR 5/2) very gravelly sandy loam, very dark brown (10YR 2/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; common very fine roots; common very fine tubular pores; 40 percent gravel; slightly acid (pH 6.5); abrupt smooth boundary.

Bt1—2 to 6 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine and common fine and medium roots; few very fine tubular pores; few thin clay films in pores; 20 percent gravel; neutral (pH 6.8); clear smooth boundary.

Bt2—6 to 11 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few medium and common fine roots; common very fine tubular pores; common thin clay films in pores; 10 percent gravel; neutral (pH 6.8); abrupt smooth boundary.

Bt3—11 to 16 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine and medium roots; common very fine tubular pores; common thin clay films in pores and few moderately thick clay films on peds; 5 percent gravel; neutral (pH 6.8); abrupt smooth boundary.

R—16 inches; hard conglomerate tuff; very thin ($^1/_{32}$ inch) discontinuous silica-cemented cap.

The depth to lithic contact and the thickness of the mollic epipedon range from 14 to 20 inches. The content of clay in the particle-size control section ranges from 18 to 27 percent in the upper part and from 27 to 35 percent in the lower part. The content

Figure 12.—Typical profile of Cuppy cobbly clay. This soil is clay throughout over a duripan and bedrock. It is mapped as a complex with Lassen cobbly clay, which is directly over bedrock. Depth is marked in feet.

Figure 13.—Typical profile of Graven silt loam. This soil is on mounds in the Fall River Valley area. The claypan and thin hardpan make the soil favorable for the production of wild rice. Depth is marked in feet.

Figure 14.—Typical profile of Henhill silt loam. This soil is on the lower stream terraces in the Fall River Valley and Big Valley areas. The black and reddish colors at a depth of about 2 feet are an indication of a fluctuating water table. Depth is marked in feet.

Figure 15.—Typical profile of Kephart very gravelly loamy coarse sand. This soil has a relatively thin layer of pumice because it is in areas farther from the source, which was mainly Glass Mountain. Depth is marked in feet.

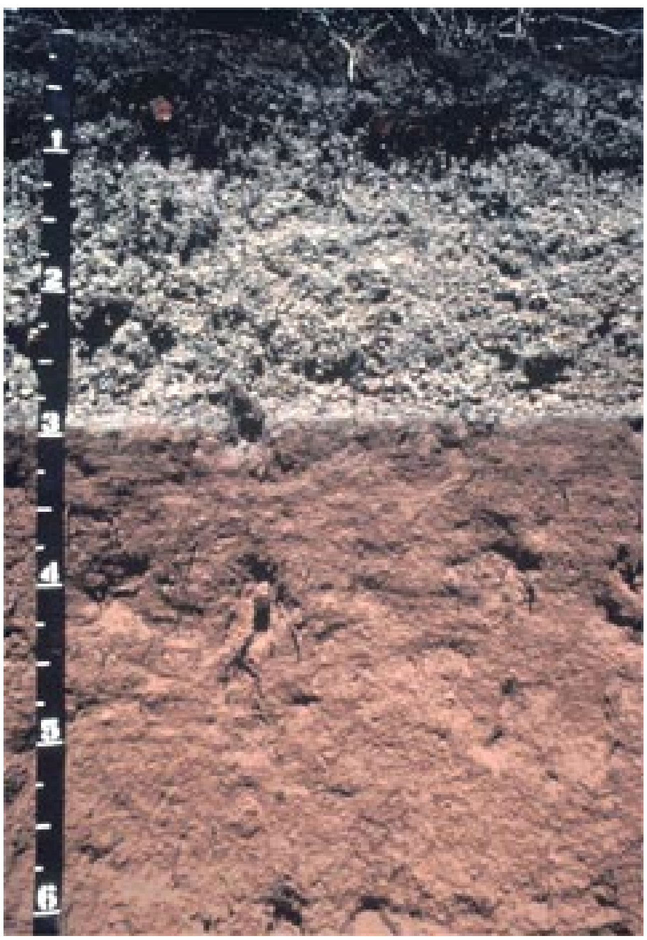


Figure 16.—Typical profile of Medlake gravelly coarse sandy loam. Note the contrast and sorting of the pumice material over the finer ash material. Depth is marked in feet.

Figure 17.—Typical profile of Ollierivas loam. This soil is on mounds throughout the survey area. The mixing of soil material with the duripan above a depth of 2 feet may indicate a degrading duripan. Depth is marked in feet.

Figure 18.—Typical profile of Stacher very gravelly coarse sandy loam. This soil formed when rock fragments and fine ash material were expelled from the neighboring volcanoes. Depth is marked in feet.

Figure 19.—Typical profile of a fragmental Zeugirdor soil. The surface layer consists dominantly of rock fragments that flowed directly from Burney Mountain. Depth is marked in feet.

of rock fragments on the surface, mostly gravel, cobbles, or stones, ranges from 35 to 80 percent.

The A horizon has dry color of 10YR 5/2 or 5/3. Moist color is 10YR 2/2, 3/1, 3/2, or 3/3. The texture is very gravelly, extremely gravelly, very cobbly, or very stony sandy loam. The content of clay ranges from 15 to 18 percent. The content of rock fragments ranges from 35 to 80 percent. The content of organic matter ranges from 1 to 3 percent. Base saturation by sum of cations ranges from 80 to 85 percent. Reaction is slightly acid or neutral.

The Bt horizon has dry color of 10YR 4/2, 4/3, 5/2, or 5/3. Moist color is 10YR 2/1, 3/1, 3/2, or 3/3 or 7.5YR 3/2. The texture is loam, gravelly loam, or clay loam. Base saturation by sum of cations ranges from 80 to 85 percent.

Matquaw Series

The Matquaw series consists of very deep, somewhat poorly drained soils that formed in alluvium derived from extrusive igneous rock. These soils are on stream terraces. Slopes range from 0 to 5 percent. The mean annual precipitation is 25 to 35 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Coarse-loamy over sandy or sandy-skeletal, mixed, active, mesic Pachic Ultic Haploxerolls

Typical Pedon

Matquaw gravelly sandy loam, 0 to 5 percent slopes, about 1.3 miles northwest of Dana; 500 feet east and 1,800 feet north of the southwest corner of sec. 13, T. 38 N., R. 3 E., Pondosa NE (East of Pondosa) quadrangle (7.5 minute series):

A1—0 to 4 inches; dark brown (10YR 4/3) gravelly sandy loam, dark brown (7.5YR 3/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many very fine and fine roots; few very fine tubular pores; 20 percent gravel; moderately acid (pH 6.0); abrupt smooth boundary.

A2—4 to 10 inches; dark brown (10YR 4/3) sandy loam, dark reddish brown (5YR 3/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; common fine and few coarse roots; few very fine tubular pores; 10 percent gravel; slightly acid (pH 6.5); abrupt smooth boundary.

A3—10 to 16 inches; brown (10YR 4/3) very fine sandy loam, dark reddish brown (5YR 3/2) moist; massive; soft, very friable, nonsticky and slightly plastic; common fine roots; common fine tubular pores; 5 percent gravel; slightly acid (pH 6.5); clear smooth boundary.

A4—16 to 27 inches; dark brown (10YR 4/3) very fine sandy loam, dark reddish brown (5YR 3/2) moist; massive; soft, very friable, nonsticky and slightly plastic; few fine roots; few very fine tubular pores; 5 percent gravel; slightly acid (pH 6.5); abrupt smooth boundary.

2AC—27 to 34 inches; dark brown (10YR 4/3) loamy sand, dark reddish brown (5YR 3/2) moist; many medium distinct strong brown (7.5YR 4/6) iron accumulations, dark red (2.5YR 3/6) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; common fine tubular pores; 5 percent gravel; slightly acid (pH 6.5); abrupt smooth boundary.

3C—34 to 72 inches; dark brown (7.5YR 4/4), stratified extremely gravelly loamy sand, dark reddish brown (5YR 3/3) moist; common medium faint strong brown (7.5YR 4/6) iron accumulations, dark red (2.5YR 3/6) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; few very fine tubular pores; 90 percent rounded gravel; moderately acid (pH 6.0).

The thickness of the solum ranges from 30 to 60 inches. The depth to loamy sand ranges from 24 to 29 inches. The particle-size control section (10 to 40 inches) averages 5 to 15 percent clay. Base saturation by sum of cations ranges from 54 to 68 percent. The content of organic matter ranges from 4 to 8 percent to a depth of 40 inches. Faint to distinct redoximorphic features with chroma of 4 to 6 are at a depth of 27 to 72 inches. Reaction is slightly acid or moderately acid.

The A horizon has dry color of 10YR 4/2, 4/3, 5/2, or 5/3. Moist color is 10YR 3/1 or 3/2, 7.5YR 3/2 or 4/2, or 5YR 3/2 or 3/3. The content of clay ranges from 10 to 15 percent. The content of rock fragments, mostly gravel, ranges from 0 to 20 percent in the A1 horizon.

The 3C horizon has dry color of 10YR 6/2 or 7.5YR 4/4 or 5/2. Moist color is 7.5YR 3/2 or 5YR 3/2 or 3/3. The texture is stratified extremely gravelly or very gravelly loamy sand and sandy loam. The content of clay ranges from 5 to 10 percent. The content of rock fragments, mostly gravel, ranges from 40 to 90 percent.

The Matquaw soil in map unit 106 is a taxadjunct because it has a thinner surface layer and higher base saturation than are defined as the range for the series. Also, it does not have contrasting particle size within a depth of 40 inches. This soil is classified as coarse-loamy, mixed, mesic Typic Haploxerolls.

Medici Series

The Medici series consists of very deep, well drained soils that formed in tephra. These soils are on hills. Slopes range from 2 to 30 percent. The mean annual precipitation is 25 to 35 inches, and the mean annual temperature is 42 to 45 degrees F.

Taxonomic classification: Medial over loamy-skeletal, mixed, superactive, frigid Typic Haploxerands

Typical Pedon

Medici coarse sandy loam, in an area of Blankout-Medici complex, 2 to 15 percent slopes, about 2.3 miles northwest of Longbell fire station; about 2,700 feet west and 3,800 feet north of the southeast corner of sec. 7, T. 42 N., R. 5 E., Whitehorse NW (Border Mountain) quadrangle (7.5 minute series):

Oi—2 inches to 0; decomposing litter.

A1—0 to 1 inch; grayish brown (10YR 5/2) coarse sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; few very fine interstitial pores; 10 percent gravel; moderately acid (pH 6.0); abrupt smooth boundary.

A2—1 to 8 inches; light gray (10YR 7/2) gravelly coarse sandy loam, brown (7.5YR 4/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common medium and many fine roots; few very fine interstitial pores; 20 percent gravel; moderately acid (pH 6.0); abrupt smooth boundary.

Bw1—8 to 19 inches; pink (7.5YR 7/4) gravelly coarse sandy loam, brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; soft, loose, nonsticky and nonplastic; few coarse and medium and many fine roots; common very fine interstitial pores; 20 percent gravel; slightly acid (pH 6.4); clear smooth boundary.

2Bw2—19 to 31 inches; pink (7.5YR 7/4) very gravelly coarse sandy loam, strong brown (7.5YR 4/6) moist; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common medium and fine roots; common very fine interstitial pores; 50 percent gravel; neutral (pH 6.6); gradual smooth boundary.

2Bw3—31 to 51 inches; pink (7.5YR 7/4) very gravelly coarse sandy loam, strong brown (7.5YR 4/6) moist; moderate medium subangular blocky structure; soft, friable, nonsticky and nonplastic; common medium and fine roots; common very fine interstitial and few very fine tubular pores; 50 percent gravel; neutral (pH 6.6); gradual smooth boundary.

2Bw4—51 to 67 inches; pink (7.5YR 7/4) very gravelly loam, strong brown (7.5YR 4/6) moist; moderate medium subangular blocky structure; soft, friable, nonsticky and nonplastic; few medium roots; common very fine interstitial and few very fine tubular pores; 50 percent gravel; neutral (pH 6.6); clear wavy boundary.

3C—67 to 75 inches; very pale brown (10YR 7/3), stratified coarse sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; few fine roots; few very fine interstitial pores; 10 percent gravel; neutral (pH 6.6).

Bulk density ranges from 0.70 to 0.90 g/cc. The mineralogy is dominated by halloysite.

The A1 horizon has dry color of 10YR 4/2, 5/2, or 5/3. Moist color is 10YR 2/1, 3/1, 3/2, 3/3, or 4/2. The content of rock fragments, mostly andesitic gravel, ranges from 5 to 10 percent. Reaction is slightly acid or moderately acid. The estimated content of glass ranges from 30 to 40 percent in the fraction that is 0.2 to 2.0 mm in size. The content of organic matter ranges from 2 to 8 percent.

The A2 horizon has dry color of 7.5YR 6/4, 7/2, or 7/4 or 10YR 6/4, 7/2, or 7/4. Moist color is 10YR 4/2 or 4/4. The content of rock fragments, mostly andesitic gravel, ranges from 15 to 35 percent. Reaction is slightly acid or moderately acid. The estimated content of glass ranges from 15 to 30 percent in the fraction that is 0.2 to 2.0 mm in size. The content of organic matter is 1 to 2 percent.

The Bw horizon has dry color of 7.5YR 5/4, 6/4, or 7/4. Moist color is 7.5YR 3/4, 4/4, or 4/6. The content of rock fragments, mostly andesitic gravel, ranges from 20 to 35 percent. Reaction is neutral or slightly acid. The estimated content of glass ranges from 15 to 30 percent in the fraction that is 0.2 to 2.0 mm in size. The content of organic matter is 1 to 2 percent.

The 2Bw horizon has dry color of 7.5YR 5/4, 6/4, or 7/4. Moist color is 7.5YR 3/4, 4/4, or 4/6. The content of organic matter ranges from less than 0.5 to 1.0 percent. The texture is very gravelly coarse sandy loam, very gravelly loam, or extremely gravelly coarse sandy loam. The content of clay ranges from 12 to 18 percent. The content of rock fragments, mostly andesitic gravel, ranges from 35 to 80 percent. Reaction is neutral or slightly acid. The estimated content of glass ranges from 15 to 30 percent in the fraction that is 0.2 to 2.0 mm in size.

The 3C horizon has dry color of 10YR 6/4 or 7/3 or 7.5YR 7/4 or 7/6. Moist color is 10YR 4/3, 4/4, or 6/4 or 7.5YR 4/6. The texture is stratified coarse sand,

sand, or loamy coarse sand. The content of clay ranges from 5 to 12 percent. The content of rock fragments, mostly cinder gravel, ranges from 10 to 80 percent. Reaction is neutral or slightly acid. The content of organic matter is 0.5 percent or less.

Medlake Series

The Medlake series consists of very deep, somewhat excessively drained soils that formed in windlaid pumiceous material over older tephra. These soils are on hills. Slopes range from 2 to 30 percent. The mean annual precipitation is 25 to 35 inches, and the mean annual temperature is 39 to 44 degrees F.

Taxonomic classification: Pumiceous or ashy-pumiceous over medial, mixed, nonacid, frigid Vitrandic Xerorthents

Typical Pedon

Medlake gravelly coarse sandy loam, 2 to 15 percent slopes (fig. 16), about 7.2 miles southwest of Tionesta; 2,500 feet east and 2,900 feet south of the northwest corner of sec. 6, T. 43 N., R. 5 E., Timber Mountain NW (Caldwell Butte) quadrangle (7.5 minute series):

Oi—1 inch to 0; recent, decomposed pine litter.

A1—0 to 2 inches; gray (10YR 5/1) gravelly coarse sandy loam, black (10YR 2/1) moist; weak very fine subangular blocky structure; loose, nonsticky and nonplastic; common very fine and fine roots; few very fine interstitial pores; 30 percent pumice gravel; moderately acid (pH 6.0); abrupt smooth boundary.

A2—2 to 6 inches; light gray (10YR 6/1) very gravelly loamy coarse sand, very dark gray (10YR 3/1) moist; weak very fine subangular blocky structure; loose, nonsticky and nonplastic; common fine roots; few fine interstitial pores; 40 percent pumice gravel; slightly acid (pH 6.4); abrupt smooth boundary.

C1—6 to 20 inches; white (10YR 8/1) extremely gravelly coarse sand, white (10YR 8/2) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; few very fine interstitial pores; 90 percent pumice gravel; slightly acid (pH 6.4); abrupt smooth boundary.

C2—20 to 31 inches; white (10YR 8/1) extremely gravelly coarse sand, white (10YR 8/2) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; few very fine interstitial pores; 90 percent pumice gravel; slightly acid (pH 6.4); abrupt smooth boundary.

C3—31 to 32 inches; white (10YR 8/1) extremely gravelly coarse sand, white (10YR 8/2) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; few very fine interstitial pores; 90 percent pumice gravel; slightly acid (pH 6.4); abrupt smooth boundary.

2Ab—32 to 43 inches; brown (7.5YR 5/4) gravelly coarse sandy loam, dark brown (7.5YR 3/4) moist; moderate fine subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine and medium roots; few very fine interstitial pores; 20 percent fine gravel; moderately acid (pH 6.0); gradual smooth boundary.

2Bwb1—43 to 69 inches; light brown (7.5YR 6/4) gravelly coarse sandy loam, brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; soft, friable, nonsticky and nonplastic; few fine and medium roots; few very fine interstitial pores; 20 percent fine gravel; moderately acid (pH 6.0); gradual smooth boundary.

2Bwb2—69 to 75 inches; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; soft, friable, nonsticky and nonplastic; few fine roots; common very fine tubular pores; few thin clay films in pores; moderately acid (pH 6.0).

The depth to bedrock is more than 60 inches. The thickness of pumiceous material ranges from 20 to 36 inches. The particle-size control section (10 to 40 inches) averages 6 to 9 percent clay. The content of organic matter ranges from 3 to 13 percent to a depth of 6 inches and is 0.4 to 0.8 percent to a depth of 75 inches. The content of rock fragments on the surface, mostly pumice gravel, ranges from 60 to 70 percent.

The A horizon has dry color of 10YR 5/1, 6/1, 6/2, or 7/2. Moist color is 10YR 2/1, 3/1, or 4/2. The texture is sandy loam, coarse sandy loam, or loamy coarse sand. The content of rock fragments, mostly pumice gravel, ranges from 25 to 50 percent. Base saturation by ammonium acetate ranges from 40 to 45 percent. Reaction is moderately acid or slightly acid. NaF pH ranges from 8.0 to 11.5.

The C horizon has dry color of 10YR 7/3 or 8/1. Moist color is 10YR 6/3, 7/2, or 8/2. The content of rock fragments, mostly pumice gravel, ranges from 70 to 90 percent. Base saturation by ammonium acetate ranges from 40 to 45 percent. Reaction is slightly acid or neutral. NaF pH ranges from 9.0 to 11.0.

The 2Ab horizon has dry color of 7.5YR 5/4, 6/2, or 6/3. Moist color is 7.5YR 3/2, 3/4, or 4/4. The content of rock fragments, mostly andesitic gravel, ranges from 15 to 30 percent. Base saturation by ammonium acetate ranges from 65 to 74 percent. Reaction ranges from moderately acid to neutral. NaF pH ranges from 9.0 to 10.5.

The 2Bwb horizon has dry color of 7.5YR 5/4 or 6/4. Moist color is 7.5YR 3/4 or 4/4. The texture is sandy loam or gravelly sandy loam. The content of rock fragments ranges from 15 to 25 percent andesitic gravel and from 0 to 35 percent andesitic cobbles. Base saturation by ammonium acetate ranges from 65 to 74 percent.

Modoc Series

The Modoc series consists of moderately deep, well drained soils that formed in alluvium derived from extrusive igneous rock. These soils are on stream terraces. Slopes range from 0 to 5 percent. The mean annual precipitation is 12 to 16 inches, and the mean annual temperature is 48 to 50 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Argiduridic Durixerolls

Typical Pedon

Modoc sandy loam, in an area of Bieber-Modoc complex, 0 to 5 percent slopes, about 0.75 mile north of Nubieber, 200 feet east of road; 250 feet east and 1,400 feet north of the southwest corner of sec. 14, T. 38 N., R. 7 E., Bieber NW (Lookout) quadrangle (7.5 minute series):

A—0 to 3 inches; brown (10YR 5/3) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate very thin platy structure; slightly hard, friable, nonsticky and nonplastic; many very fine roots; many very fine tubular pores; 10 percent gravel; neutral (pH 7.0); clear smooth boundary.

Bt1—3 to 5 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine tubular pores; few thin clay films in pores; 10 percent gravel; neutral (pH 7.0); clear wavy boundary.

Bt2—5 to 9 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine tubular pores; common thin clay films in pores; 10 percent gravel; neutral (pH 7.0); clear wavy boundary.

Bt3—9 to 16 inches; yellowish brown (10YR 5/4) sandy clay loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; very hard, friable, slightly sticky and plastic; few very fine, fine, and medium roots; few fine and common very fine tubular pores; common moderately thick clay films in pores; 5 percent gravel; neutral (pH 7.2); clear wavy boundary.

Bt4—16 to 23 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 3/4) moist; moderate medium subangular blocky structure; very hard, firm, slightly sticky and plastic; few very fine roots; few very fine tubular pores; common moderately thick clay films in pores and on peds; 10 percent gravel; neutral (pH 7.2); abrupt wavy boundary.

2Bt5—23 to 32 inches; light yellowish brown (10YR 6/4) sandy clay, dark yellowish brown (10YR 4/4) moist; strong fine prismatic structure parting to moderate fine angular blocky; extremely hard, firm, sticky and plastic; few very fine roots; few very fine tubular pores; 10 percent gravel; common moderately thick clay films in pores and on peds; slightly alkaline (pH 7.4); abrupt smooth boundary.

2Bkqm1—32 to 33 inches; light gray (10YR 7/1) duripan, light yellowish brown (10YR 6/4) moist; strong thin platy structure; extremely hard, brittle; strongly effervescent; segregated lime on plates; moderately alkaline (pH 8.0); abrupt smooth boundary.

2Bkqm2—33 to 60 inches; light gray (10YR 7/1) duripan, light yellowish brown (10YR 6/4) moist; massive; very hard, brittle; strongly effervescent with disseminated lime; moderately alkaline.

Depth to the duripan ranges from 20 to 40 inches. The duripan is 1 to 4 feet thick over alluvium.

The A horizon has dry color of 10YR 5/2 or 5/3. Moist color is 10YR 3/2 or 3/3. The texture is sandy loam or loam. The content of clay ranges from 18 to 25 percent. Reaction ranges from slightly acid to moderately alkaline.

The Bt horizon has dry color of 10YR 5/3, 5/4, or 6/3. Moist color is 10YR 3/4 or 4/3. The texture is sandy clay loam or clay loam. The content of clay ranges from 25 to 35 percent. Reaction ranges from neutral to moderately alkaline.

The 2Bt horizon has dry color of 10YR 6/3 or 6/4. Moist color is 10YR 4/3 or 4/4. The texture is sandy clay or clay. The content of clay ranges from 35 to 45 percent. Reaction ranges from neutral to moderately alkaline.

Mounthat Series

The Mounthat series consists of moderately deep, well drained soils that formed in debris flow and ash over vesicular andesite. These soils are on mountains. Slopes range from 5 to 75 percent. The

mean annual precipitation is 40 to 60 inches, and the mean annual temperature is 39 to 44 degrees F.

Taxonomic classification: Medial-skeletal, mixed, frigid Pachic Melanoxerands

Typical Pedon

Mounthat gravelly sandy loam, in an area of Obie-Mounthat complex, 5 to 15 percent slopes, approximately 6 miles west of Burney, 4 miles north from the intersection of Highway 299 and Bunchgrass Road, 80 feet north-northeast of Bunchgrass Road; about 1,200 feet west and 1,900 feet north of the southeast corner of sec. 18, T. 35 N., R. 2 E., Chalk Mountain quadrangle (7.5 minute series):

A1—0 to 4 inches; dark brown (10YR 3/3) gravelly sandy loam, black (10YR 2/1) moist; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine interstitial pores; 20 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

A2—4 to 10 inches; brown (10YR 4/3) gravelly sandy loam, very dark brown (10YR 2/2) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine interstitial pores; 20 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); gradual smooth boundary.

A3—10 to 21 inches; dark brown (10YR 4/3) very cobbly sandy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine interstitial pores; 15 percent gravel and 10 percent cobbles; 15 percent stones and boulders of nonvesicular andesite; slightly acid (pH 6.5); clear wavy boundary.

2Bw—21 to 27 inches; brown (7.5YR 4/4) very cobbly sandy loam, dark brown (7.5YR 3/4) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; many very fine interstitial pores; 10 percent gravel and 25 percent cobbles; 10 percent stones and boulders of nonvesicular andesite; slightly acid (pH 6.5); gradual wavy boundary.

2Cr—27 inches; weathered vesicular andesite with soil filling fractures.

The depth to paralithic contact ranges from 20 to 40 inches. The particle-size control section (from 10 inches to the paralithic contact) ranges from 35 to 60 percent rock fragments, mostly cobbles and gravel. Reaction is slightly acid or moderately acid throughout.

The A1 and A2 horizons have dry color of 10YR 3/3, 4/2, or 4/3 or 7.5YR 4/4. Moist color is 10YR 2/1 or 2/2. The content of organic matter ranges from 15 to 30 percent. The content of rock fragments, mostly gravel or cobbles, ranges from 15 to 30 percent. NaF pH is 10.0 to 11.0. Base saturation by ammonium acetate ranges from 10 to 25 percent.

The A3 horizon has dry color of 10YR 4/3 or 5/4, 7.5YR 4/4, or 5YR 4/4. Moist color is 10YR 2/2 or 7.5YR 3/2. The content of organic matter ranges from 6 to 10 percent. The texture is very cobbly or very gravelly sandy loam. The content of rock fragments, mostly cobbles or gravel, ranges from 35 to 60 percent. NaF pH is 9.0 to 10.0. Base saturation by ammonium acetate ranges from 1 to 12 percent.

The 2Bw horizon has dry color of 10YR 4/3 or 5/4, 7.5YR 4/4, or 5YR 4/4. Moist color is 10YR 4/3 or 7.5YR 3/4 or 4/4. The content of organic matter ranges from 2 to 5 percent. The texture is very cobbly or very gravelly sandy loam. The content of rock fragments, mostly cobbles or gravel, ranges from 35 to 60 percent. NaF pH is 9.0 to 10.0. Base saturation by ammonium acetate ranges from 5 to 15 percent.

Murken Series

The Murken series consists of moderately deep, well drained soils that formed in colluvium and eolian deposits derived from extrusive igneous rock. These soils are on plateau escarpments. Slopes range from 15 to 30 percent. The mean annual precipitation is 16 to 20 inches, and the mean annual temperature is 47 to 49 degrees F.

Taxonomic classification: Loamy-skeletal, mixed, superactive, mesic Pachic Haploxerolls

Typical Pedon

Murken very stony loam, 15 to 30 percent slopes, about 8 miles southeast of McArthur, 0.75 mile south of the intersection of Pittville Road and the Cindercone District BLM entrance road; 400 feet south and 1,320 feet west of the northeast corner of sec. 24, T. 36 N., R. 5 E., Jellico NE (Cable Mountain) quadrangle (7.5 minute series):

A—0 to 2 inches; yellowish brown (10YR 5/4) very stony loam, dark brown (7.5YR 3/2) moist; weak thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; few very fine vesicular pores; 20 percent gravel and 20 percent stones; slightly acid (pH 6.5); clear wavy boundary.

ABt—2 to 7 inches; dark yellowish brown (10YR 4/4) very stony loam, dark brown (7.5YR 3/2) moist; moderate very fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine, common fine, and few very fine roots; common very fine tubular and common very fine interstitial pores; few thin clay films in bridges between pores; 20 percent gravel and 20 percent stones; slightly acid (pH 6.5); clear wavy boundary.

Bt1—7 to 13 inches; brown (7.5YR 4/4) bouldery loam, dark brown (7.5YR 3/2) moist; moderate very fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine, fine, and medium and few coarse roots; few very fine, fine, and medium tubular pores; common thin clay films in bridges between mineral grains and in pores and few thin clay films on faces of peds; 10 percent gravel, 5 percent cobbles, 5 percent stones, 10 percent boulders; neutral (pH 7.0); gradual wavy boundary.

Bt2—13 to 23 inches; brown (7.5YR 4/4) bouldery loam, dark brown (7.5YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, sticky and slightly plastic; many very fine and common fine roots; common very fine and fine tubular and interstitial pores; common thin clay films in bridges of mineral grains and in pores and thin clay films on faces of peds; 5 percent gravel, 5 percent cobbles, 10 percent stones, 10 percent boulders; neutral (pH 7.0); clear irregular boundary.

Bt3—23 to 33 inches; brown (7.5YR 4/4) very bouldery loam, dark reddish brown (5YR 3/2) moist; moderate very fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common coarse roots; few very fine, fine, and medium roots; 10 percent gravel, 10 percent cobbles, 15 percent stones, 25 percent boulders; neutral (pH 7.0); abrupt smooth boundary.

2R—33 inches; fractured, unweathered basalt with cracks 6 to 10 inches apart; cracks are $^{1}/_{2}$ inch to 2 inches wide and contain little soil material.

The depth to lithic contact ranges from 20 to 40 inches. The thickness of the mollic epipedon ranges from 20 to 40 inches. The particle-size control section averages 18 to 25 percent clay and 35 to 60 percent rock fragments, mostly stones and boulders. The content of rock fragments on the surface, mostly stones or cobbles, ranges from 35 to 60 percent. NaF pH is 8.0 to 8.5. Base saturation by Hach kit ranges from 75 to 90 percent. The content of organic matter is 1 to 2 percent throughout and decreases regularly with depth. Reaction is slightly acid or neutral.

The A horizon has moist color of 7.5YR 3/2 or 5YR 3/2. The content of rock fragments, mostly stones or gravel, ranges from 35 to 60 percent. The content of clay ranges from 18 to 25 percent.

The Bt horizon has dry color of 7.5YR 4/4 or 5/4.

Nanny Series

The Nanny series consists of very deep, well drained soils that formed in alluvium derived from basic igneous rocks. These soils are on alluvial terraces and fans. Slopes range from 0 to 9 percent. The mean annual precipitation is 50 to 60 inches, and the mean annual temperature is 47 to 50 degrees F.

Taxonomic classification: Loamy-skeletal, mixed, superactive, frigid Typic Xerumbrepts

Typical Pedon

Nanny gravelly sandy loam, 0 to 9 percent slopes, 120 feet north of a logging road running parallel to the McCloud River railroad track, about 2 miles northwest of Bartle, 0.1 mile east of a 90-degree south curve in the track; 400 feet south and 1,100 feet west of the northeast corner of sec. 33, T. 40 W., R. 1 E., Bartle SE (Bartle) quadrangle (7.5 minute series):

O—1 inch to 0; decomposing needles, twigs, and other organic debris.

A—0 to 8 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (7.5YR 3/2) moist; weak very fine, fine, and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium and few coarse roots; common very fine and fine interstitial and few medium interstitial and tubular pores; 15 percent gravel; slightly acid (pH 6.5); clear smooth boundary.

Bw—8 to 22 inches; strong brown (7.5YR 5/6) very gravelly sandy loam, brown (7.5YR 4/4) moist; weak very fine and fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine, common medium, and few coarse roots; many very fine and common fine and medium interstitial pores; 45 percent gravel and 5 percent cobbles; moderately acid (pH 6.0); gradual smooth boundary.

2C1—22 to 33 inches; yellowish brown (10YR 5/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine and coarse and common medium roots; many very fine and fine and common medium tubular pores; 45

percent gravel and 5 percent cobbles; moderately acid (pH 6.0); gradual smooth boundary.

2C2—33 to 42 inches; yellowish brown (10YR 5/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; common medium and few fine roots; many very fine and fine and common medium and few coarse tubular pores; 40 percent gravel, 5 percent cobbles, 10 percent stones; slightly acid (pH 6.2); gradual wavy boundary.

2C3—42 to 60 inches; yellowish brown (10YR 5/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few medium roots; common very fine and fine interstitial and common medium tubular pores; 35 percent gravel, 5 percent cobbles, 15 percent stones; moderately acid (pH 6.0).

The thickness of the solum ranges from 29 to 60 inches. The particle-size control section (10 to 40 inches) ranges from 10 to 18 percent clay and from 15 to 60 percent rock fragments, mostly gravel and cobbles. The content of rock fragments averages more than 35 percent in the particle-size control section. The content of rock fragments on the surface, mainly gravel or cobbles, ranges from 0 to 35 percent.

The A horizon has dry color of 10YR or 7.5YR 3/2, 3/3, 4/2, 4/3, 5/2, or 5/3. Moist color is 10YR or 7.5YR 2.5/2, 3/2, or 3/3. The content of organic carbon ranges from 2 to 6 percent. The content of clay ranges from 6 to 18 percent. The content of rock fragments, mostly gravel or cobbles, ranges from 15 to 35 percent. Reaction ranges from slightly acid to strongly acid.

The Bw horizon has dry color of 10YR or 7.5YR 5/2, 5/3, 5/4, 5/6, 6/2, 6/3, 6/4, 7/3, or 7/4. Moist color is 10YR or 7.5YR 3/2, 3/3, 3/4, 4/2, 4/3, 4/4, 5/2, 5/3, or 5/4. The content of organic carbon ranges from 0.4 to 0.9 percent. The texture is very gravelly loam or sandy loam. The content of clay ranges from 10 to 18 percent. The content of rock fragments, mostly gravel and cobbles, ranges from 35 to 60 percent. Reaction ranges from very strongly acid to slightly acid.

The C horizon has dry color of 10YR 5/3, 5/4, 5/5, 6/4, or 7/4 or 7.5YR 5/3, 5/4, or 5/5. Moist color is 10YR 3/3, 4/3, 4/4, or 5/5 or 7.5YR 4/4 or 5/6. The texture is very gravelly or extremely gravelly sandy loam or coarse sandy loam. The content of rock fragments ranges from 35 to 70 percent.

Neer Series

The Neer series consists of moderately deep, well drained soils that formed in glacial outwash derived from extrusive igneous rock. These soils are on lava plateaus and mountains. Slopes range from 2 to 75 percent. The mean annual precipitation is 40 to 60 inches, and the mean annual temperature is 45 to 50 degrees F.

Taxonomic classification: Medial-skeletal, mixed, mesic Typic Vitrixerands

Typical Pedon

Neer gravelly sandy loam, in an area of Neer-Ponto complex, 2 to 30 percent slopes, about 3.5 miles northwest of McCloud, 0.1 mile east of Mountain House Road on a power line access road; 1,600 feet east and 2,100 feet south of the northwest corner of sec. 33, T. 40 N., R. 3 W., Shasta SW (McCloud) quadrangle (7.5 minute series):

Oi—1 inch to 0; recent and partially decomposed needles, leaves, twigs, and other organic debris.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) gravelly sandy loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure parting to weak very fine granular; soft, loose, nonsticky and nonplastic, weakly smeary; many very fine roots; common very fine interstitial pores; 15 percent fine gravel; moderately acid (pH 5.9); abrupt smooth boundary.

A2—2 to 5 inches; dark brown (10YR 4/3) gravelly sandy loam, dark brown (10YR 3/3) moist; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic, weakly smeary; many very fine and common fine roots; many very fine tubular pores; 15 percent fine gravel; slightly acid (pH 6.4); clear smooth boundary.

AB—5 to 16 inches; dark brown (10YR 4/3) gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic, weakly smeary; common very fine, fine, medium, and coarse roots; common very fine and few fine tubular pores; 15 percent fine gravel; slightly acid (pH 6.5); clear smooth boundary.

Bw1—16 to 30 inches; yellowish brown (10YR 5/4) very gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic, weakly smeary;

common fine and medium and few very fine roots; few very fine tubular and interstitial and few fine tubular pores; 35 percent gravel and 10 percent cobbles; neutral (pH 6.5); gradual wavy boundary.

Bw2—30 to 36 inches; yellowish brown (10YR 5/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic, weakly smeary; common fine and medium roots; few very fine interstitial pores; 40 percent gravel and 15 percent cobbles; neutral (pH 6.5); gradual wavy boundary.

2Cr—36 inches; fractured, weathered vesicular andesite.

The depth to paralithic contact and the thickness of the volcanic ash mantle range from 20 to 40 inches. Bulk density ranges from 0.5 to 1.0 g/cc to a depth of 10 to 14 inches and is 0.85 g/cc or more below a depth of 14 inches. NaF pH ranges from 10.0 to 10.7. Reaction ranges from slightly acid to strongly acid.

The upper part of the A horizon has dry color of 10YR 3/2, 3/3, 4/2, 4/3, 5/2, or 5/3; 7.5YR 3/2, 4/2, or 5/2; or 5YR 3/2, 3/3, 4/2, 4/3, 4/4, or 5/2. Moist color is N 2/0 or 3/0; 10YR 2/2, 3/2, or 3/3; 7.5YR 3/2; or 5YR 3/2 or 3/3. The lower part of the A horizon has dry color of 10YR 4/3, 5/4, or 6/4; 7.5YR 5/4 or 6/4; or 5YR 5/4 or 6/4. Moist color is 10YR 3/4 or 4/4, 7.5YR 4/4, or 5YR 3/4 or 4/4. The A horizon is gravelly sandy loam or stony sandy loam. The content of rock fragments ranges from 15 to 35 percent. Base saturation ranges from 20 to 50 percent.

The Bw horizon has dry color of 10YR 5/4, 5/6, 6/4, 6/6, 7/4, or 7/6; 7.5YR 5/4, 5/6, 6/4, 6/6, or 7/4; or 5YR 5/4, 5/6, 6/4, 6/6, 7/4, or 7/6. Moist color is 10YR 3/4, 4/4, 5/4, or 5/6; 7.5YR 4/4 or 5/6; or 5YR 4/4, 4/6, or 5/4. The content of rock fragments ranges from 35 to 60 percent. Base saturation ranges from 10 to 20 percent.

The Neer soil in map unit 230 has a lower mean annual precipitation and a higher pH than are defined for the series. These differences, however, do not significantly affect use and management.

Neuns Series

The Neuns series consists of moderately deep, well drained soils that formed in material derived from metamorphic rock. These soils are on lava plateaus and mountains. Slopes range from 15 to 75 percent. The mean annual precipitation is 30 to 60 inches, and the mean annual temperature is 45 to 50 degrees F.

Taxonomic classification: Loamy-skeletal, mixed, active, mesic Dystric Xerochrepts

Typical Pedon

Neuns gravelly sandy loam, in an area of Kindig-Neuns complex, 30 to 50 percent slopes, about 3.5 miles southwest of McCloud, 2.1 miles south of Snowman Hill Road, 40 feet west of Upper Soda Creek Road; 800 feet east and 800 feet south of the northwest corner of sec. 16, T. 39 N., R. 3 W., Shoeinhorse NW (Girard Ridge) quadrangle (7.5 minute series):

Oi—3 inches to 0; recent and decomposing needles, twigs, leaves, and other organic debris.

A—0 to 3 inches; dark grayish brown (10YR 4/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and few fine roots; many very fine and fine interstitial pores; 25 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

AB—3 to 7 inches; yellowish brown (10YR 5/4) gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine interstitial pores; 35 percent gravel; moderately acid (pH 6.0); clear smooth boundary.

Bt1—7 to 13 inches; yellowish brown (10YR 5/4) very gravelly sandy loam, dark brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and medium and common fine roots; common fine interstitial and few fine tubular pores; few thin clay films on faces of peds and in pores; 50 percent gravel; moderately acid (pH 6.0); clear smooth boundary.

Bt2—13 to 23 inches; light yellowish brown (10YR 6/4) very gravelly loam, brown (7.5YR 5/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine interstitial pores; few thin clay films on faces of peds and in pores; few medium clay lamellae; 55 percent fine gravel; moderately acid (pH 5.6); abrupt smooth boundary.

C—23 to 32 inches; light yellowish brown (10YR 6/4) very gravelly loam, strong brown (7.5YR 5/6) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; few fine tubular pores; 55 percent fine gravel; moderately acid (pH 5.6); clear smooth boundary.

R—32 inches; hard, fractured shale that is diagonally bedded in place.

The depth to lithic contact ranges from 20 to 40 inches. Reaction ranges from slightly acid to very strongly acid. Base saturation below a depth of 10 inches ranges from 25 to 60 percent. The particle-size control section (from 10 inches to the lithic contact) ranges from 8 to 18 percent clay. The content of rock fragments ranges from 35 to 70 percent. Stones make up 0 to 15 percent of the upper part of the A horizon and cover 0 to 15 percent of the surface.

The A horizon has dry color of 2.5Y 4/2, 5/2, or 6/2; 10YR 4/2, 4/3, 4/4, 5/2, 5/3, 5/4, 5/6, 6/2, 6/3, or 6/4; or 7.5YR 4/2, 5/2, or 6/2. Moist color is 10YR 2/2, 3/2, 3/3, 4/2, 4/3, 4/4, or 5/3 or 7.5YR 3/2. The content of clay ranges from 6 to 17 percent. The content of rock fragments ranges from 15 to 35 percent.

The Bt horizon has dry color of 10YR 4/4, 5/3, 5/4, 6/2, 6/3, 6/4, 7/3, or 7/4 or 7.5YR 4/4, 5/4, 5/6, 6/4, or 6/6. Moist color is 10YR 3/4, 4/3, 4/4, 4/6, 5/3, or 5/4 or 7.5YR 3/2, 3/4, 4/4, 4/6, 5/4, or 5/6. The texture is very gravelly or extremely gravelly sandy loam or loam. The content of rock fragments, mostly gravel, ranges from 35 to 60 percent. Some pedons do not have clay films.

The C horizon has colors and textures similar to those of the Bt horizon. The content of rock fragments ranges from 35 to 80 percent.

Nikal Series

The Nikal series consists of moderately deep, well drained soils that formed in debris flow of andesite and ash deposited over basalt. These soils are on lava plateaus and mountains. Slopes range from 2 to 15 percent. The mean annual precipitation is 40 to 60 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Medial over loamy-skeletal, mixed, superactive, mesic Humic Haploxerands

Typical Pedon

Nikal sandy loam, in an area of Nikal-Chatterdown-Lava flows complex, 2 to 9 percent slopes, about 7.5 miles east of McCloud, 0.6 mile east of the Upper Falls of the McCloud River, 100 feet southwest of a dirt road; 1,200 feet east and 2,600 feet north of the southwest corner of sec. 8, T. 39 N., R. 1 W., Big Bend NW (Grizzly Peak) quadrangle (7.5 minute series):

Oi—1 inch to 0; recent and partially decomposed needles, leaves, twigs, and other organic debris.

A1—0 to 10 inches; dark grayish brown (10YR 4/2) sandy loam, very dark brown (10YR 2/2) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine and few medium roots; many very fine interstitial and tubular pores; 10 percent gravel; weakly smeary; moderately acid (pH 5.9); gradual wavy boundary.

A2—10 to 18 inches; dark brown (10YR 4/3) sandy loam, very dark brown (10YR 2/2) moist; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky and nonplastic; many fine and common medium roots; few fine interstitial and common fine tubular pores; 10 percent gravel; weakly smeary; slightly acid (pH 6.1); gradual wavy boundary.

Bw—18 to 28 inches; brown (7.5YR 5/4) gravelly sandy loam, dark brown (7.5YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and nonplastic; many fine and common medium roots; few fine interstitial and common fine tubular pores; 25 percent rock fragments, mostly gravel; weakly smeary; slightly acid (pH 6.1); gradual wavy boundary.

C—28 to 36 inches; brown (7.5YR 5/4) very gravelly sandy loam, dark brown (7.5YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common fine roots; common fine tubular pores; 60 percent rock fragments, mostly gravel; weakly smeary; slightly acid (pH 6.1); abrupt wavy boundary.

2R—36 inches; fractured basalt; vertical fractures.

The depth to lithic contact ranges from 20 to 40 inches. The thickness of material with andic soil properties ranges from 14 to 20 inches. Base saturation is less than 50 percent. Reaction is moderately acid or slightly acid.

The A horizon has dry color of 10YR 5/5, 4/4, 4/3, 4/2, 3/3, or 3/2; 7.5YR 4/2; or 5YR 3/4 or 3/3. Moist color is 10YR 3/3, 3/2, 3/1, or 2/2 or 7.5YR 3/2. The texture is sandy loam, fine sandy loam, gravelly sandy loam, or gravelly fine sandy loam. The content of rock fragments, mostly pumice gravel, ranges from 5 to 25 percent. Bulk density ranges from 0.80 to 0.90 g/cc.

The Bw horizon has dry color of 10YR 6/4, 5/3, 4/4, 4/3, 4/2, or 3/3; 7.5YR 5/6 or 5/4; or 5YR 3/4 or 3/3. Moist color is 10YR 4/4, 4/3, 3/4, or 3/2 or 7.5YR 3/2. The content of rock fragments, mostly gravel or cobbles, ranges from 15 to 35 percent. Bulk density ranges from 0.85 to 1.00 g/cc.

The C horizon has dry color of 10YR 5/4, 4/4, 4/3, or 3/4 or 7.5YR 5/6 or 5/4. Moist color is 10YR 3/2, 3/3, 4/3, or 4/4 or 7.5YR 3/2, 3/4, or 4/6. The texture is gravelly sandy loam, very gravelly sandy loam, or

extremely gravelly sandy loam. The content of rock fragments, mostly gravel and cobbles, ranges from 20 to 60 percent.

Nosoni Series

The Nosoni series consists of very deep, somewhat poorly drained soils that formed in alluvium derived from extrusive igneous rock. These soils are on terraces and at basin edges. Slopes range from 0 to 5 percent. The mean annual precipitation is 20 to 35 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Typic Argiaquolls

Typical Pedon

Nosoni loam, 0 to 5 percent slopes, about 8.6 miles north of McArthur; 2,100 feet north and 1,150 feet west of the southeast corner of sec. 33, T. 39 N., R. 5 E., Fall River Mills NW (Timbered Crater) quadrangle (7.5 minute series):

A—0 to 2 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate thin platy structure; slightly hard, friable, nonsticky and slightly plastic; many very fine and common fine roots; common very fine and fine tubular pores; neutral (pH 6.6); clear smooth boundary.

BA—2 to 8 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak medium platy structure parting to moderate fine subangular blocky; very hard, firm, slightly sticky and slightly plastic; many very fine and few fine roots; common very fine and fine tubular pores; neutral (pH 6.6); abrupt wavy boundary.

Bt1—8 to 18 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to common medium subangular blocky; extremely hard, firm, sticky and plastic; many very fine and few fine roots; common thin clay films on peds and common thin clay films in pores; neutral (pH 6.8); clear wavy boundary.

Bt2—18 to 27 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; common medium distinct yellowish brown (10YR 5/6 moist) iron accumulations; weak medium and coarse subangular blocky structure; extremely hard, firm, sticky and plastic; common very fine and few fine and coarse roots; common very fine and few tubular pores; many thin clay films on peds and many thin clay films in pores; neutral (pH 7.0); gradual wavy boundary.

Bt3—27 to 57 inches; grayish brown (10YR 5/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; common medium distinct yellowish brown (10YR 5/6 moist) iron accumulations; weak medium and coarse subangular blocky structure; very hard, friable, slightly sticky and plastic; few very fine roots; common very fine and few fine tubular pores; few thin clay films on peds, many thin clay films in pores, and many thin clay films bridging mineral grains; neutral (pH 7.0); gradual smooth boundary.

Bt4—57 to 80 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 4/3) moist; common medium distinct yellowish brown (10YR 5/6 moist) masses of iron accumulation; weak medium subangular blocky structure; very hard, friable, sticky and plastic; few very fine roots; common very fine tubular pores; few thin clay films on peds, many thin clay films in pores, and many thin clay films bridging mineral grains; neutral (pH 7.0).

The depth to bedrock and the thickness of the solum are more than 80 inches. The particle-size control section (8 to 28 inches) averages 27 to 30 percent clay. Base saturation by sum of cations ranges from 60 to 75 percent. The content of organic matter ranges from 2 to 4 percent to a depth of 27 inches. Some pedons have a C horizon that has clay textures.

The A horizon has dry color of 10YR 4/1, 4/2, or 5/2 or 7.5YR 5/2. Moist color is 10YR 2/2, 3/1, or 3/2 or 7.5YR 3/2. The content of clay ranges from 18 to 27 percent.

The Bt horizon has dry color of 10YR 4/2, 5/1, 5/2, 5/3, or 6/3 or 7.5YR 4/2, 5/2, 5/4, or 6/4. Moist color is 10YR 3/2, 3/3, 4/2, or 4/3 or 7.5YR 3/2, 4/2, 3/4, or 4/4. The texture is sandy clay loam or clay loam. The content of clay ranges from 27 to 35 percent.

Obie Series

The Obie series consists of deep, well drained soils that formed in material weathered from andesitic debris flow. These soils are on mountains. Slopes range from 5 to 50 percent. The mean annual precipitation is 40 to 60 inches, and the mean annual temperature is 39 to 44 degrees F.

Taxonomic classification: Medial-skeletal, mixed, frigid Typic Melanoxerands

Typical Pedon

Obie very gravelly sandy loam, in an area of Obie-

Mounthat complex, 30 to 50 percent slopes, about 500 feet east of Dry Creek, 30 feet east of an unimproved road; 100 feet south and 1,000 feet west of the northeast corner of sec. 27, T. 39 N., R. 1 E., Big Bend NW (Grizzly Peak) quadrangle (7.5 minute series):

Oi—1 inch to 0; new and partially decomposed needles, leaves, twigs, and organic material.

A1—0 to 7 inches; dark brown (7.5YR 3/2) very gravelly sandy loam, black (7.5YR 2.5/1) moist; moderate very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial and tubular pores; 40 percent gravel and 5 percent stones; moderately acid (pH 6.0); clear wavy boundary.

A2—7 to 20 inches; brown (7.5YR 5/4) very gravelly sandy loam, very dark brown (7.5YR 2.5/2) moist; moderate very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and common medium and coarse roots; many very fine and fine interstitial and tubular pores; 30 percent gravel and 5 percent cobbles; moderately acid (pH 6.0); gradual wavy boundary.

A3—20 to 35 inches; brown (7.5YR 5/4) very gravelly sandy loam, dark reddish brown (5YR 3/3) moist; moderate very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and few medium and coarse roots; many very fine and fine interstitial and tubular pores; 40 percent gravel and 10 percent stones; moderately acid (pH 6.0); gradual wavy boundary.

Bw—35 to 46 inches; brown (7.5YR 5/4) very gravelly sandy loam, dark reddish brown (5YR 3/3) moist; moderate very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; common very fine and fine interstitial and tubular pores; 40 percent gravel and 10 percent stones; strongly acid (pH 5.5); gradual wavy boundary.

Cr—46 inches; weathered, fractured andesite; soil in cracks.

The depth to weathered bedrock ranges from 40 to more than 60 inches. The content of volcanic ash is less than 60 percent throughout the upper 7 to 14 inches of the profile. Bulk density ranges from 0.55 g/cc in the upper part to 0.85 g/cc in the lower part.

The A horizon has dry color of 10YR 4/2, 4/3, 5/3, or 5/4; 7.5YR 3/2, 4/2, 4/4, or 5/4; or 5YR 3/3, 4/3, or 4/4. Moist color is 10YR 2/1, 2/2, 3/1, 3/2, or 3/3; 7.5YR 2.5/1, 2.5/2, 3/2, or 3/4; or 5YR 3/1, 3/2, 3/3, or 3/4. The content of rock fragments ranges from 5 to 35 percent. Reaction is slightly acid or moderately acid. The content of organic matter ranges from 4 to 20 percent, but the average does not exceed 10 percent in the top 20 inches.

The Bw horizon has dry color of 10YR 4/3, 4/4, 5/3, 5/4, or 6/4 or 7.5YR 4/4, 5/4, or 6/4. Moist color is 10YR 3/3, 4/3, 4/4, or 5/4; 7.5YR 3/2, 3/4, 4/4, or 5/4; or 5YR 3/3, 3/4, or 4/4. The content of rock fragments ranges from 35 to 65 percent. Reaction ranges from slightly acid to very strongly acid. Base saturation ranges from 30 to 40 percent.

Odas Series

The Odas series consists of very deep, poorly drained soils that formed in alluvium and glacial outwash derived from volcanic ejecta and extrusive igneous rock. These soils are on small flood plains along streams. Slopes range from 0 to 2 percent. The mean annual precipitation is 40 to 50 inches, and the mean annual temperature is 47 to 50 degrees F.

Taxonomic classification: Coarse-loamy, mixed, superactive, nonacid, mesic Cumulic Humaquepts

Typical Pedon

Odas loam, 0 to 2 percent slopes, about 2 miles south of McCloud, halfway between a dirt road and Squaw Valley Creek; 1,200 feet south and 700 feet west of the northeast corner of sec. 24, T. 39 N., R. 3 W., Shoeinhorse Mountain NW (Girard Ridge) quadrangle (7.5 minute series):

A1—0 to 3 inches; dark grayish brown (10YR 4/2) loam, black (10YR 2/1) moist; weak very fine granular structure; soft, friable, slightly sticky and slightly plastic; many very fine and fine matted roots; strongly acid (pH 5.5); abrupt smooth boundary.

A2—3 to 8 inches; dark grayish brown (10YR 4/2) loam, black (10YR 2/1) moist; massive; slightly hard, friable, slightly sticky and nonplastic; many fine, very fine, and medium roots; few fine tubular and common fine vesicular pores; strongly acid (pH 5.5); abrupt smooth boundary.

A3—8 to 16 inches; dark grayish brown (10YR 4/2) sandy loam, black (10YR 2/1) moist; very weak subangular blocky structure parting to moderate fine granular; slightly hard, very friable, slightly sticky and nonplastic; many very fine, fine, and medium roots; few fine tubular and common fine vesicular pores; strongly acid (pH 5.5); abrupt wavy boundary.

A4—16 to 31 inches; dark grayish brown (2.5Y 4/2) sandy loam, very dark brown (10YR 2/2) moist; few fine distinct olive brown (2.5Y 4/4 moist) iron accumulations; very weak subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; many very fine, fine, and medium roots; few fine tubular and common fine vesicular pores; strongly acid (pH 5.5); abrupt wavy boundary.

C1—31 to 34 inches; grayish brown (2.5Y 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; common fine distinct olive brown (2.5Y 4/4 moist) iron accumulations; very weak subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; many medium and common very fine and fine roots; few very fine and fine tubular and common fine vesicular pores; strongly acid (pH 5.5); abrupt wavy boundary.

C2—34 to 41 inches; grayish brown (2.5Y 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; common fine distinct dark yellowish brown (10YR 4/4 moist) iron accumulations; very weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; many very fine and medium roots; few very fine and fine tubular pores; moderately acid (pH 5.8); clear wavy boundary.

Cg1—41 to 53 inches; light brownish gray (10YR 6/2) sandy loam, very dark grayish brown (10YR 3/2) moist; common large distinct dark yellowish brown (10YR 4/4 moist) iron accumulations; massive; soft, very friable, nonsticky and nonplastic; few fine and very fine and common medium roots; few fine and very fine tubular and common fine vesicular pores; slightly brittle in pockets; moderately acid (pH 5.8); abrupt wavy boundary.

Cg2—53 to 60 inches; gray (10YR 6/1) sandy loam, dark grayish brown (2.5Y 4/2) moist; common medium distinct olive brown (2.5Y 4/4 moist) iron accumulations; massive; slightly hard, very friable, nonsticky and nonplastic; common medium and few fine and very fine roots; few fine and very fine tubular pores; moderately acid (pH 5.8).

Soil depth is 60 inches or more. The water table is at the surface 1 to 2 weeks in the early spring (March and April) and fluctuates between the depths of 18 and 36 inches the rest of the year. The water table level depends upon the season and the occurrence of irrigation on these or adjacent soils. The soils have an aquic moisture regime. Redoximorphic features are in the lower part of the A horizon and in the C horizon. They are few or common; fine, medium, or large; and distinct. They have moist color of 10YR 4/4, 5/4, or 5/6 or 2.5Y 4/4, 5/4, or 5/6.

The A horizon has dry color of 10YR 3/1, 3/2, 4/1, 4/2, 5/1, or 5/2 or 2.5Y 3/2, 4/2, or 5/2. Moist color is N 2/0 or 3/0; 10YR 2/1, 2/2, 3/1, or 3/2; or 2.5Y 3/2. The texture is sandy loam or loam. The content of clay ranges from 5 to 18 percent. The content of rock fragments, mostly fine and medium rounded gravel, ranges from 3 to 15 percent. Reaction is moderately acid or strongly acid. Base saturation ranges from 35 to 60 percent but is less than 50 percent in the upper 5 to 10 inches.

The C horizon has dry color of 10YR 5/1, 5/2, 5/3, 6/1, 6/2, or 6/3 or 2.5Y 5/2 or 6/2. Moist color is 10YR 3/1, 3/2, 3/3, 4/1, 4/2, or 4/3 or 2.5Y 3/2 or 4/2. The color in the lower part of the C horizon is commonly 1 unit higher in value or chroma, both moist and dry, than in the A horizon. The C horizon is sandy loam or loam. The content of clay ranges from 5 to 18 percent. The content of rock fragments ranges from 3 to 25 percent. Some pedons have strata of gravel or cobbles at a depth of 45 inches or more.

Ollierivas Series

The Ollierivas series consists of moderately deep, well drained soils that formed in alluvium derived from extrusive igneous rock. These soils are on lava plateaus. Slopes range from 2 to 9 percent. The mean annual precipitation is 14 to 18 inches, and the mean annual temperature is 45 to 50 degrees F.

Taxonomic classification: Fine, smectitic, mesic Argiduridic Durixerolls

Typical Pedon

Ollierivas loam (fig. 17), in an area of Jellycamp-Splawn-Ollierivas complex, 2 to 15 percent slopes, about 5 miles south of Pittville and about 0.75 mile west of the Shasta-Lassen county line on a dirt road off Pittville Road, about 150 feet south of the dirt road; 2,000 feet east and 800 feet south of the northwest corner of sec. 12, T. 36 N., R. 5 E., Jellico NE (Cable Mountains) quadrangle (7.5 minute series):

A1—0 to 1 inch; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate thick platy structure parting to weak very fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; common very fine, fine, and medium tubular and few very fine and fine vesicular pores; 5 percent gravel and manganese shot; neutral (pH 6.6); abrupt smooth boundary.

A2—1 to 3 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate thick platy structure parting to weak thin and medium platy; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine and fine tubular pores; 5 percent gravel and manganese shot; neutral (pH 6.6); clear smooth boundary.

BAt—3 to 5 inches; brown (10YR 5/3) loam, dark brown (7.5YR 3/2) moist; moderate medium and coarse subangular blocky structure parting to moderate thin and medium platy; slightly hard, friable, sticky and plastic; common very fine roots; common very fine and fine tubular pores; many thin clay films in bridges between mineral grains and common thin clay films on peds and in pores; 3 percent gravel and manganese shot; neutral (pH 6.6); clear wavy boundary.

Bt1—5 to 10 inches; brown (10YR 4/3) clay loam, dark brown (7.5YR 3/2) moist; moderate medium and coarse subangular blocky structure; hard, friable, sticky and plastic; common very fine roots; many very fine and few fine roots; tubular pores; many thin clay films in bridges between mineral grains and common moderately thick clay films on peds and in pores; 3 percent gravel and manganese shot; neutral (pH 6.6); clear wavy boundary.

Bt2—10 to 23 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate medium and coarse prismatic structure parting to moderate medium and coarse subangular blocky; very hard, firm, sticky and plastic; few very fine roots; common very fine tubular pores; many moderately thick clay films on peds and in pores; 3 percent gravel and manganese shot; neutral (pH 7.0); abrupt smooth boundary.

Bqm—23 to 31 inches; duripan; continuous silica-cemented cap with medium and thin platy structure; indurated, brittle when moist, extremely hard when dry, does not slake in water.

2R—31 inches; hard tuff.

Depth to the duripan ranges from 20 to 40 inches. The depth to bedrock ranges from 30 to 50 inches. The content of organic carbon ranges from 0.6 to 2.1 percent to a depth of 8 to 10 inches.

The A horizon has dry color of 10YR 4/2, 4/3, 5/2, or 5/3. Moist color is 10YR 3/2 or 3/3. The content of clay ranges from 18 to 25 percent.

The BAt horizon has dry color of 10YR 4/2, 4/3, or 5/3 or 7.5YR 4/4. Moist color is 10YR 3/2 or 7.5YR 3/2 or 4/2.

The Bt1 and Bt2 horizons have dry color of 10YR 4/3 or 7.5YR 4/2, 4/3, 4/4, 5/4, or 6/4. Moist color is 10YR 3/2 or 3/3 or 7.5YR 3/2, 3/3, or 3/4. The texture is clay loam or clay. The content of clay ranges from 35 to 50 percent.

The Bqm horizon has a continuous laminar cap ranging from 1/2 inch to 3 inches thick.

Orhood Series

The Orhood series consists of shallow, well drained soils that formed in material weathered from extrusive igneous rock. These soils are on hills and lava plateaus. Slopes range from 2 to 50 percent. The mean annual precipitation is 10 to 16 inches, and the mean annual temperature is 44 to 50 degrees F.

Taxonomic classification: Loamy-skeletal, mixed, superactive, mesic Lithic Argixerolls

Typical Pedon

Orhood very cobbly loam, in an area of Ricketts-Orhood complex, 15 to 30 percent slopes, about 1.7 miles north of the intersection of Spring Gulch and dirt road; 1,550 feet south and 2,000 feet east of the northwest corner of sec. 2, T. 36 N., R. 7 E., Little Valley NW (Little Valley) quadrangle (7.5 minute series):

A—0 to 3 inches; brown (10YR 5/3) very cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; common very fine interstitial and few very fine tubular pores; 10 percent gravel and 40 percent cobbles; neutral (pH 6.6); clear smooth boundary.

Bt1—3 to 8 inches; brown (7.5YR 5/4) very cobbly loam, dark brown (7.5YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine tubular pores; few thin clay films on faces of peds and common thin clay films in pores; 10 percent gravel and 45 percent cobbles; neutral (pH 6.6); clear smooth boundary.

Bt2—8 to 16 inches; brown (7.5YR 5/4) very cobbly clay loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine roots; common very fine tubular pores; common thin clay films on faces of peds and many thin clay films in pores; 10 percent gravel and 45 percent cobbles; neutral (pH 7.8); abrupt irregular boundary.

R—16 to 20 inches; hard basalt with cracks that are 1/2 to 1 inch wide and 12 to 24 inches apart.

The depth to bedrock ranges from 14 to 20 inches.

The A horizon has dry color of 10YR 5/3 or 5/2 or 7.5YR 5/3. Moist color is 10YR 3/3 or 3/2 or 7.5YR 3/2. The texture is very cobbly loam, very stony loam, or very stony sandy loam and averages 10 to 15 percent clay. The content of rock fragments ranges from 35 to 60 percent.

The Bt horizon has dry color of 10YR 6/4, 5/4, 5/3, 5/2, or 4/3 or 7.5YR 5/4 or 5/2. Moist color is 10YR 3/2, 3/3, 3/4, or 4/4 or 7.5YR 3/4, 3/2, or 4/2. The texture is very cobbly clay loam or very cobbly loam. The content of rock fragments ranges from 35 to 55 percent.

Oxendine Series

The Oxendine series consists of shallow, moderately well drained soils that formed in alluvium derived from extrusive igneous rock. These soils are on terraces. Slopes range from 0 to 9 percent. The mean annual precipitation is 14 to 16 inches, and the mean annual temperature is 48 to 50 degrees F.

Taxonomic classification: Loamy, mixed, superactive, mesic, shallow Argiduridic Durixerolls

Typical Pedon

Oxendine extremely gravelly sandy loam, in an area of Oxendine-Sweagert complex, 0 to 5 percent slopes, about 3.2 miles southeast of Adin; 200 feet east and 2,600 feet south of the northwest corner of sec. 10, T. 38 N., R. 9 E., Adin NW (Adin) quadrangle (7.5 minute series):

A—0 to 2 inches; brown (10YR 5/3) extremely gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and slightly plastic; few very fine roots; common very fine vesicular pores; 65 percent fine gravel and 5 percent cobbles; neutral (pH 6.8); abrupt smooth boundary.

Bt1—2 to 4 inches; brown (10YR 5/3) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and common fine and medium roots; many very fine tubular pores; few thin clay films in pores; 10 percent fine gravel; neutral (pH 6.8); clear smooth boundary.

Bt2—4 to 10 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine and few very fine and medium roots; common very fine tubular pores; common thin clay films in pores and few moderately thick clay films on faces of peds; 5 percent fine gravel; neutral (pH 6.8); abrupt smooth boundary.

Bqm—10 to 20 inches; duripan; strong thin platy structure; continuous silica cap 1/8 inch thick; extremely hard, brittle; 70 percent cemented gravel; neutral (pH 7.0); abrupt smooth boundary.

Cr—20 inches; soft lacustrine tuff.

Depth to the duripan ranges from 10 to 14 inches. The duripan is 10 to 15 inches thick over soft lacustrine tuff. The particle-size control section (0 to 14 inches) averages 25 to 35 percent clay and 25 to 35 percent rock fragments, mostly gravel. Base saturation by sum of cations ranges from 95 to 100 percent. The content of organic matter ranges from 2 to 3 percent to a depth of 10 inches. The content of rock fragments on the surface, mostly gravel, ranges from 35 to 75 percent.

The A horizon has dry color of 10YR 5/3 or 5/4. Moist color is 10YR 3/2 or 3/3. The texture is very gravelly sandy loam, extremely gravelly sandy loam, or very cobbly sandy loam. The content of clay ranges from 15 to 20 percent. The content of gravel ranges from 30 to 70 percent, and the content of cobbles ranges from 5 to 30 percent.

The Bt horizon has dry color of 10YR 5/2, 5/3, or 5/4 or 7.5YR 5/4. Moist color is 10YR 3/2 or 3/3 or 7.5YR 3/2. The texture is sandy clay loam, clay loam, or very gravelly sandy clay loam. The content of clay ranges from 25 to 35 percent. The content of gravel ranges from 5 to 15 percent in the upper part and from 10 to 30 percent in the lower part. The content of cobbles ranges from 5 to 15 percent in the lower part.

The Oxendine soil in map unit 270 is a taxadjunct because it averages 35 to 50 percent clay in the Bt horizon. This soil is classified as clayey, smectitic, mesic, shallow Argiduridic Durixerolls.

Pastolla Series

The Pastolla series consists of very deep, very poorly drained soils that formed in stratified alluvium derived from ash and lake sediments. These soils are in basins and on low terraces. Slopes range from 0 to 2 percent. The mean annual precipitation is 12 to 20 inches, and the mean annual temperature is 48 to 52 degrees F.

Taxonomic classification: Fine-silty, mixed, superactive, mesic Cumulic Endoaquolls

Typical Pedon

Pastolla muck, drained, 0 to 2 percent slopes, about 6 miles north of Fall River Mills; 900 feet south and 300 feet west of the northeast corner of projected sec. 29, T. 38 N., R. 5 E., Fall River Mills SW (Fall River Mills) quadrangle (7.5 minute series):

Oa—0 to 5 inches; muck, black (N 2/0) moist and crushed, very dark gray (10YR 3/1) dry; strong fine granular structure; soft, very friable, moderately smeary, nonsticky and nonplastic; many very fine roots; many very fine tubular pores; slightly alkaline (pH 7.8); abrupt smooth boundary.

A1—5 to 10 inches; mucky silt loam, black (N 2/0 and 10YR 2/1) moist, uncrushed, dark gray (10YR 4/1), light gray or gray (10YR 6/1), and black (10YR 2/1) dry; moderate medium subangular blocky structure; slightly hard, friable, moderately smeary, slightly sticky and slightly plastic; common very fine pores; moderately alkaline (pH 8.2); abrupt smooth boundary.

A2—10 to 11 inches; mucky silt loam, black (N 2/0) moist, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure; slightly hard, friable, moderately smeary, slightly sticky and slightly plastic; common very fine and few fine roots; many very fine tubular pores; slightly effervescent; moderately alkaline (pH 8.3); abrupt smooth boundary.

A3—11 to 19 inches; mucky silt loam, black (10YR 2/1) or dark grayish brown (10YR 4/2) moist, uncrushed, and black (10YR 2/1) moist, crushed; gray (10YR 5/1) and light gray (10YR 6/1) dry; moderate fine subangular blocky structure; slightly hard, friable, weakly smeary, slightly sticky and slightly plastic; common very fine and few fine roots; many very fine tubular pores; thin strata (1/4 to 1/2 inch) of ashy material; strongly alkaline (pH 8.5); abrupt smooth boundary.

C1—19 to 22 inches; stratified silt loam, yellowish brown (10YR 5/4) or strong brown (7.5YR 4/6) moist, uncrushed, and brown (7.5YR 4/4) moist, crushed; pale brown (10YR 6/3) and yellow (10YR 7/6) dry; moderate very fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; few very fine and fine roots; many very fine and common fine tubular pores; strongly alkaline (pH 8.5); abrupt smooth boundary.

C2—22 to 29 inches; silty clay, very dark gray (10YR 3/1) moist, light gray or gray (10YR 6/1) and light gray (10YR 7/1) dry; moderate medium subangular blocky structure; hard, friable, moderately smeary, slightly sticky and slightly plastic; few very fine roots; many very fine and fine tubular pores; small pieces of obsidian and fibers of organic material; moderately alkaline (pH 8.3); abrupt smooth boundary.

C3—29 to 38 inches; loam, dark grayish brown (10YR 4/2) moist, light gray (10YR 7/1) dry; massive; hard, friable, moderately smeary, slightly sticky and plastic; few very fine roots; many very fine and fine tubular pores; moderately alkaline (pH 8.3); abrupt smooth boundary.

C4—38 to 47 inches; clay, grayish brown (10YR 5/2) moist, gray (10YR 5/1) dry; massive; very hard, friable, sticky and plastic; few very fine roots; few very fine and fine tubular pores; slightly effervescent; slightly alkaline (pH 7.5); abrupt smooth boundary.

C5—47 to 55 inches; loam, yellowish brown (10YR 5/4) moist, light gray (10YR 7/2) dry; moderate fine subangular blocky structure; slightly hard, very friable, nonsticky and slightly plastic; few very fine roots; few very fine and fine tubular pores; moderately alkaline (pH 8.1); abrupt smooth boundary.

2Btq—55 to 64 inches; coarse sandy loam, dark yellowish brown (10YR 4/4) and brown (7.5YR 4/4) moist, uncrushed, and brown (7.5YR 5/4) moist, crushed; light gray (10YR 7/1) and brownish yellow (10YR 6/6) dry; many fine distinct reddish yellow (7.5YR 6/6) iron accumulations; strong fine angular blocky structure; hard, very friable, slightly brittle, nonsticky and nonplastic; many clay films in pores; few very fine tubular pores; violently effervescent; disseminated carbonates; moderately alkaline (pH 8.1).

Depth to the brittle horizon ranges from 40 to 60 inches. The calcium carbonate equivalent ranges to 2 percent in calcareous horizons.

The O horizon has dry color of N 2/0 or 10YR 5/1, 4/1, or 3/1. Moist color is N 2/0 or 10YR 3/1 or 2/1. The content of organic matter ranges from 25 to 30 percent. The content of clay ranges from 30 to 35 percent. Bulk density is 0.35 to 0.45 g/cc. Reaction ranges from neutral to moderately alkaline.

The A horizon has dry color of 10YR 2/1, 3/1, 4/1, 4/2, 5/1, or 6/1 or N 2/0. Moist color is 10YR 2/1, 3/1, 3/2, or 4/1 or N 2/0. Redoximorphic features have moist color of 10YR 6/1 or 2/1, 2.5YR 5/4, 2.5Y 4/4, or N 2/0. The content of organic matter ranges from 8 to 20 percent. The texture is stratified silt loam or silty clay loam. The content of clay ranges from 25 to 35 percent. Bulk density is 0.45 to 0.50 g/cc. Reaction

ranges from moderately alkaline to very strongly alkaline.

The C horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 6. When moist, it has hue of 10YR or 7.5YR or is neutral in hue and has value of 3 to 5 and chroma of 0 to 3. The content of organic matter ranges from 0.2 to 10.0 percent but is typically less than 1 percent below a depth of 25 inches. The texture is stratified silt loam, loam, silty clay, and clay. The content of clay ranges from 10 to 45 percent. Bulk density is 0.25 to 1.00 g/cc. Reaction ranges from moderately alkaline to very strongly alkaline.

Patburn Series

The Patburn series consists of very deep, somewhat poorly drained soils that formed in alluvium derived from extrusive igneous rock. These soils are on stream terraces. Slopes range from 0 to 2 percent. The mean annual precipitation is 16 to 25 inches, and the mean annual temperature is 45 to 50 degrees F.

Taxonomic classification: Fine, smectitic, mesic Pachic Argixerolls

Typical Pedon

Patburn loam, 0 to 2 percent slopes, about 8 miles northwest of Lookout; 1,900 feet north and 550 feet west of the southeast corner of sec. 33, T. 41 N., R. 6 E., Whitehorse SE (Egg Lake) quadrangle (7.5 minute series):

A—0 to 2 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; common fine prominent strong brown (7.5YR 5/6) iron accumulations; moderate thin platy structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine and fine tubular pores; neutral (pH 6.6); abrupt smooth boundary.

Bt1—2 to 7 inches; brown (10YR 5/3) clay loam, dark brown (7.5YR 3/2) moist; few fine distinct dark yellowish brown (10YR 4/6) iron accumulations; moderate fine subangular blocky structure; very hard, friable, slightly sticky and plastic; common very fine and fine roots; common very fine and fine tubular pores; few thin clay films on faces of peds; neutral (pH 6.6); clear smooth boundary.

Bt2—7 to 13 inches; grayish brown (10YR 5/2) clay loam, dark brown (7.5YR 3/2) moist; common fine prominent strong brown (7.5YR 4/6) iron accumulations; moderate fine subangular blocky structure; very hard, firm, slightly sticky and plastic; few very fine roots; common very fine and fine tubular pores; common moderately thick clay films on faces of peds; neutral (pH 7.0); abrupt smooth boundary.

Bt3—13 to 32 inches; brown (10YR 5/3) clay, dark brown (7.5YR 3/2) moist; common fine and medium prominent strong brown (7.5YR 4/6) iron accumulations; coarse prismatic structure parting to moderate medium subangular blocky; extremely hard, very firm, sticky and plastic; few very fine roots; few very fine tubular pores; common thin clay films in pores; slightly alkaline (pH 7.8); clear smooth boundary.

2Bt4—32 to 38 inches; brown (10YR 5/3) loam, dark brown (7.5YR 4/2) moist; common medium prominent strong brown (7.5YR 4/6) iron accumulations; moderate fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; common thin clay films in pores; slightly alkaline (pH 7.8); abrupt smooth boundary.

2Bt5—38 to 44 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine roots; common very fine and fine and few medium tubular pores; few thin clay films in pores; slightly alkaline (pH 7.8); abrupt smooth boundary.

2Bt6—44 to 50 inches; light brown (7.5YR 6/4) clay loam, brown (7.5YR 4/4) moist; few fine distinct strong brown (7.5YR 4/6) iron accumulations; weak very fine subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; many very fine and fine tubular pores; common thin clay films on faces of peds; slightly alkaline (pH 7.8); abrupt smooth boundary.

3Bt7—50 to 72 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 4/4) moist; few fine distinct strong brown (7.5YR 4/6) iron accumulations; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine and common fine tubular pores; few thin clay films on faces of peds; moderately alkaline (pH 8.0).

The particle-size control section averages 35 to 50 percent clay. Base saturation by ammonium acetate ranges from 80 to 100 percent. The content of organic matter ranges from 2 to 4 percent to a depth of 20 to 35 inches.

The A horizon has dry color of 10YR 4/2, 5/3, or 5/2. Moist color is 10YR 3/2 or 3/3. The content of organic matter ranges from 2 to 4 percent. The texture is loam or clay loam with 15 to 40 percent modified by 0

to 15 percent gravel. Reaction is slightly acid or neutral. Base saturation by ammonium acetate ranges from 80 to 90 percent.

The Bt horizon has dry color of 10YR 5/2, 5/3, or 4/3 or 7.5YR 4/3 or 4/4. Moist color is 10YR or 7.5YR 3/2. The content of organic matter is 1 to 2 percent. The content of clay ranges from 30 to 55 percent modified by 0 to 10 percent gravel. Reaction is neutral or slightly alkaline. Base saturation by ammonium acetate ranges from 90 to 100 percent.

The 2Bt and 3Bt horizons have dry color of 10YR 6/2, 6/4, 5/2, 5/3, or 5/4 or 7.5YR 6/4, 5/4, 4/4, or 4/6. Moist color is 7.5YR 4/2 or 4/4 or 10YR 3/4, 3/3, or 4/3. The content of clay ranges from 25 to 35 percent modified by 0 to 15 percent gravel. Reaction ranges from neutral to moderately alkaline. Base saturation by ammonium acetate ranges from 90 to 100 percent.

Pit Series

The Pit series consists of very deep, poorly drained soils that formed in fine textured alluvium weathered from extrusive and basic igneous rocks. These soils are on flood plains and in basins. Slopes range from 0 to 5 percent. The mean annual precipitation is 14 to 16 inches, and the mean annual temperature is 48 to 52 degrees F.

Taxonomic classification: Fine, smectitic, mesic Xeric Endoaquerts

Typical Pedon

Pit silty clay, drained, 0 to 2 percent slopes, about 1 mile southwest of Bieber; 1,200 feet east and 600 feet north of the southwest corner of sec. 22, T. 38 S., R. 7 E., Bieber SW (Bieber) quadrangle (7.5 minute series):

A1—0 to 2 inches; dark gray (10YR 4/1) silty clay, black (10YR 2/1) moist; strong very fine granular structure; very hard, friable, sticky and very plastic; common very fine and fine roots; many fine interstitial pores; cracks 1½ inches wide; neutral (pH 7.0); abrupt smooth boundary.

A2—2 to 4 inches; dark gray (10YR 4/1) silty clay, black (10YR 2/1) moist; moderate thin platy structure; very hard, friable, sticky and very plastic; common very fine and fine roots; many very fine tubular pores; cracks 1½ inches wide; neutral (pH 7.0); clear smooth boundary.

Bss—4 to 22 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; strong coarse prismatic structure; very hard, very firm, sticky and very plastic; common very fine and fine and few coarse exped roots and common very fine roots; common very fine tubular pores; cracks ½ inch wide in the lower part; many intersecting slickensides; slightly alkaline (pH 7.4); clear wavy boundary.

Bk1—22 to 40 inches; dark gray (10YR 4/1) clay, very dark brown (10YR 2/2) moist; strong medium angular blocky structure; very hard, firm, sticky and very plastic; many very fine and common fine tubular pores; violently effervescent; lime in seams and soft masses; moderately alkaline (pH 8.0); clear wavy boundary.

Bk2—40 to 45 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores; violently effervescent; lime in seams and soft masses; moderately alkaline (pH 8.0); clear smooth boundary.

C—45 to 60 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; few fine distinct dark yellowish brown (10YR 3/4) iron accumulations; massive; slightly hard, friable, nonsticky and slightly plastic; few very fine roots; many very fine and fine tubular pores; slightly alkaline (pH 7.5).

The thickness of the mollic epipedon and the depth to carbonates range from 20 to 26 inches. The soil has cracks 1 to 5 cm wide at a depth of 20 to 26 inches. The cracks open and close once each year. They remain open during the period from July through October and remain closed the rest of the year. Common or many intersecting slickensides are in all or part of the Bss horizon. The water table is at a depth of 2 to 3 feet from December through May. Drained phases have a water table at a depth of 5 to 6 feet.

The A and Bss horizons have dry color of 10YR 3/1, 4/1, 4/2, 5/1, or 5/2 or N 3/0, 4/0, or 5/0. Moist color is 10YR 2/1 or 3/1 or N 2/0 or 3/0. The texture is silty clay loam, silty clay, or clay. Reaction is neutral or slightly alkaline.

The Bk horizon has dry color of 10YR 4/1, 4/2, 5/1, or 6/2. Moist color is 10YR 2/2, 3/2, or 4/2. The texture is silty clay or clay. The content of clay ranges from 35 to 60 percent. Reaction is slightly alkaline or moderately alkaline. Segregated lime occurs as soft masses or in seams.

The C horizon has dry color of 10YR 4/3, 4/2, 5/3, 5/2, 6/3, or 6/2; 2.5Y 4/2, 5/2, or 6/2; or 5Y 6/3 or 7/2. Moist color is 10YR 3/2, 3/3, 4/2, or 4/3; 2.5Y 3/2 or 4/2; or 5Y 4/2. Distinct or prominent iron accumulations are present in some part of this horizon below a depth of 40 inches. The C horizon is

silt loam, sandy clay loam, clay loam, or silty clay loam. Reaction is slightly alkaline or moderately alkaline. In most pedons this horizon is calcareous.

Pittville Series

The Pittville series consists of very deep, well drained soils that formed in alluvium derived from extrusive igneous rock. These soils are on stream terraces. Slopes range from 0 to 30 percent. The mean annual precipitation is 16 to 20 inches, and the mean annual temperature is 50 to 52 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Typic Argixerolls

Typical Pedon

Pittville sandy loam, 0 to 5 percent slopes, about 2 miles west on Dean Knoch Road from the intersection of Pittville Road and Dean Knoch Road, 1,600 feet south of Dean Knoch Road in a field; 300 feet east and 2,300 feet north of the southwest corner of sec. 23, T. 37 N., R. 5 E., Fall River Mills SE (Pittville) quadrangle (7.5 minute series):

A1—0 to 5 inches; brown (10YR 5/3) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium platy structure; slightly hard, very friable, slightly sticky and nonplastic; common very fine roots; common very fine and few fine tubular pores; neutral (pH 7.0); abrupt wavy boundary.

A2—5 to 9 inches; brown (10YR 5/3) sandy loam, very dark grayish brown (10YR 3/2) moist; weak thick platy structure; hard, friable, slightly sticky and nonplastic; common very fine roots; common very fine and few fine tubular pores; neutral (pH 7.0); abrupt smooth boundary.

Bt1—9 to 16 inches; grayish brown (10YR 5/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and few fine and medium roots; common very fine and few fine tubular pores; few thin clay films on peds and many thin clay films in bridges between mineral grains; neutral (pH 7.0); clear smooth boundary.

Bt2—16 to 24 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 4/3) moist; weak coarse subangular blocky structure; hard, friable, sticky and slightly plastic; common very fine and few fine roots; common very fine and few fine tubular pores; common thin clay films on peds and many thin clay films in pores; neutral (pH 7.0); clear wavy boundary.

Bt3—24 to 31 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common very fine and few fine roots; common very fine and few fine tubular pores; many thin clay films on peds and in pores; neutral (pH 7.0); clear wavy boundary.

Bt4—31 to 41 inches; light yellowish brown (10YR 6/4) sandy clay loam, dark brown (10YR 4/3) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and few fine roots; common very fine and few fine tubular pores; common thin clay films on peds and many thin clay films in bridges between mineral grains; neutral (pH 7.0); gradual wavy boundary.

2Bt5—41 to 49 inches; light yellowish brown (10YR 6/4) loamy sand, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and few fine roots; common very fine interstitial pores; common thin clay films in bridges between mineral grins; neutral (pH 7.0); gradual wavy boundary.

3Bq—49 to 84 inches; light brownish gray (10YR 6/2) sand, very dark grayish brown (10YR 3/2) moist; massive; soft, friable, nonsticky and nonplastic; few very fine roots; common very fine interstitial pores; slight silica cementation; neutral (pH 7.0); abrupt smooth boundary.

3Bqm—84 inches; cemented lacustrine tuff in laminar layers.

The depth to lacustrine tuff is more than 60 inches. The particle-size control section ranges from 20 to 30 percent clay and from 0 to 5 percent rock fragments, mostly gravel.

The A horizon has dry color of 10YR 4/2, 5/2, or 5/3. Moist color is 10YR or 7.5YR 3/2. The content of organic matter ranges from 2 to 4 percent. The texture is sandy loam or loam. The content of clay ranges from 10 to 18 percent. The content of rock fragments, mostly gravel, range from 0 to 10 percent. Reaction is slightly acid or neutral.

The upper part of the Bt horizon has dry color of 10YR 4/2, 5/2, 5/3, or 5/4. Moist color is 10YR 3/2, 4/2, or 4/3 or 7.5YR 3/2 or 4/4. The content of organic matter is 0.5 to 1.0 percent. The texture is sandy clay loam or clay loam. The content of clay ranges from 20 to 30 percent. The content of rock fragments, mostly gravel, ranges from 0 to 15 percent. Reaction is slightly acid or neutral.

The lower part of the Bt horizon and the Bq horizon have dry color of 10YR 5/2, 5/3, 6/2, 6/4, 7/3, or 8/3. Moist color is 10YR 3/2, 3/3, 4/2, 4/3, 4/4, or

5/3. The content of organic matter is less than 0.2 percent. The texture is sand, loamy sand, or sandy loam. The content of clay ranges from 5 to 15 percent. The content of rock fragments, mostly gravel, ranges from 5 to 15 percent.

Pitvar Series

The Pitvar series consists of deep, somewhat poorly drained soils that formed in alluvium derived from extrusive igneous rock. These soils are in basins and drainageways. Slopes range from 0 to 2 percent. The mean annual precipitation is 16 to 35 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Fine, smectitic, mesic Typic Epiaquerts

Typical Pedon

Pitvar clay, in an area of Lasvar-Pitvar complex, 0 to 2 percent slopes, about 8 miles northwest of Lookout; 600 feet west and 1,600 feet south of the northeast corner of sec. 22, T. 40 N., R. 6 E., Whitehorse SE (Egg Lake) quadrangle (7.5 minute series):

Ass—0 to 36 inches; brown (7.5YR 5/2) clay, dark brown (7.5YR 3/2) moist; few very fine distinct black (N 2/0) iron depletions; strong coarse prismatic structure parting to strong fine angular blocky; extremely hard, extremely firm, very sticky and plastic; common fine roots; few very fine tubular pores; common intersecting slickensides; slightly alkaline (pH 7.5); clear smooth boundary.

Bss1—36 to 44 inches; brown (7.5YR 5/2) clay, brown (7.5YR 4/2) moist; common very fine distinct black (N 2/0) iron depletions; moderate coarse prismatic structure parting to moderate coarse angular blocky; extremely hard, extremely firm, very sticky and very plastic; few fine roots; few very fine tubular pores; common intersecting slickensides; slightly alkaline (pH 7.5); gradual smooth boundary.

Bss2—44 to 55 inches; brown (7.5YR 5/4) silty clay, brown (7.5YR 4/4) moist; common very fine distinct black (N 2/0) iron depletions; moderate coarse prismatic structure parting to moderate medium angular blocky; extremely hard, extremely firm, very sticky and very plastic; few very fine roots; few very fine tubular pores; common intersecting slickensides; slightly alkaline (pH 7.8); abrupt smooth boundary.

Bqm—55 to 58 inches; light brown (7.5YR 6/4), continuously indurated, silica-cemented duripan, brown (7.5YR4/4) moist; few very fine distinct black (N 2/0) iron depletions; weak thin platy structure; extremely hard, very firm, sticky and plastic; few very fine tubular pores; moderately alkaline (pH 8.0); abrupt smooth boundary.

C—58 to 72 inches; light brown (7.5YR 6/4) clay loam, brown (7.5YR 4/4) moist; few very fine distinct black (N 2/0) iron accumulations; moderate medium angular blocky structure; very hard, very firm, sticky and plastic; common very fine tubular pores; moderately alkaline (pH 8.0).

Depth to the duripan ranges from 50 to 60 inches. The particle-size control section ranges from 40 to 60 percent clay. Surface cracks are 0.5 inch to 2.0 inches wide and extend to a depth of 20 to 25 inches. Some pedons have manganese shot in the Bss horizon.

The Ass horizon has dry color of 7.5YR or 10YR 4/2 or 5/2. Moist color is 7.5YR 3/2 or 2/2 or 10YR 3/2 or 4/2. The content of organic matter is 1 to 2 percent. The content of clay ranges from 40 to 50 percent.

The Bss horizon has dry color of 7.5YR 5/2 or 5/4 or 10YR 4/2 or 5/2. Moist color is 7.5YR 4/2, 4/4, or 6/4 or 10YR 3/2 or 4/2. The texture is clay or silty clay. The content of clay ranges from 40 to 60 percent. Reaction is slightly alkaline or moderately alkaline.

The Bqm horizon is slightly alkaline or moderately alkaline. It has colors similar to those of the C horizon.

The C horizon has dry color of 7.5YR 5/4, 6/4, 5/6, or 6/6. Moist color is 7.5YR 4/4 or 4/6. The texture is clay loam or silty clay loam. The content of clay ranges from 35 to 40 percent. Reaction is slightly alkaline or moderately alkaline.

Ponto Series

The Ponto series consists of very deep, well drained soils that formed in volcanic ash. These soils are on alluvial terraces and toe slopes. Slopes range from 2 to 50 percent. The mean annual precipitation is 30 to 60 inches, and the mean annual temperature is 45 to 50 degrees F.

Taxonomic classification: Medial, mixed, mesic Typic Vitrixerands

Typical Pedon

Ponto sandy loam, 2 to 15 percent slopes, about 1.5 miles southwest of McCloud, 1.0 mile south of the old McCloud Rifle Range; 500 feet east and 1,100 feet south of the northwest corner of sec. 17, T. 39 N., R. 2 W., Shoeinhorse Mountain NE (Lake McCloud) quadrangle (7.5 minute series):

Oi—2 inches to 0; leaves, needles, and twigs in

various stages of decomposition; abrupt smooth boundary.

A1—0 to 2 inches; dark brown (10YR 3/3) sandy loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; many very fine and fine interstitial pores; neutral (pH 6.6); clear smooth boundary.

A2—2 to 8 inches; yellowish brown (10YR 5/4) sandy loam, dark brown (7.5YR 3/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; common very fine and fine interstitial and few fine tubular pores; neutral (pH 6.8); clear smooth boundary.

Bw1—8 to 19 inches; yellowish brown (10YR 5/4) sandy loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, and coarse and common medium roots; common very fine and fine interstitial and few fine tubular pores; neutral (pH 6.8); gradual smooth boundary.

Bw2—19 to 31 inches; light yellowish brown (10YR 6/4) sandy loam, brown (7.5YR 4/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium, and coarse roots; few very fine and fine interstitial and tubular pores; neutral (pH 7.0); gradual wavy boundary.

Bw3—31 to 40 inches; light yellowish brown (10YR 6/4) sandy loam, brown (7.5YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine, fine, and medium roots; few very fine and fine interstitial and tubular pores; 5 percent fine gravel; neutral (pH 7.0); gradual wavy boundary.

Bw4—40 to 62 inches; light yellowish brown (10YR 6/4) sandy loam, strong brown (7.5YR 4/4) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few fine and medium roots; few very fine and fine interstitial and tubular pores; 5 percent fine gravel; neutral (pH 6.7); gradual wavy boundary.

C—62 to 68 inches; very pale brown (10YR 7/4) sandy loam, dark brown (10YR 3/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine and medium roots; few very fine and fine interstitial and tubular pores; 7 percent gravel; neutral (pH 6.7).

The A horizon has dry color of 10YR 3/2, 3/3, 3/4, 4/2, 4/3, 4/4, 5/2, 5/3, or 5/4 or 7.5YR 3/2, 4/2, 4/4, 5/2, or 5/4. Moist color is N 2/0 or 3/0; 10YR 2/1, 2/2, 3/1, 3/2, 3/3, or 3/4; 7.5YR 2.5/2, 3/2, or 3/4; or 5YR 3/4 or 3/3. The content of rock fragments ranges from 5 to 15 percent. Base saturation by ammonium acetate ranges from 15 to 40 percent.

The Bw horizon has dry color of 10YR 5/3, 5/4, 6/3, 6/4, or 7/4; 7.5YR 4/4, 5/4, 6/4, or 7/4; or 5YR 5/3, 5/4, 5/6, 6/4, or 7/4. Moist color is 10YR 3/4, 4/3, or 4/4; 7.5YR 3/4 or 4/4; or 5YR 3/4, 4/3, 4/4, or 4/6. The texture is sandy loam or loam. The content of rock fragments ranges from 5 to 15 percent. Reaction ranges from neutral to very strongly acid.

The C horizon has dry color of 10YR 5/4, 5/6, 6/4, 6/6, or 7/4; 7.5YR 5/4, 5/6, 6/4, or 7/4; or 5YR 5/4, 5/6, 6/4, or 7/4. Moist color is 10YR 3/3, 4/4, 5/4, or 5/6; 7.5YR 4/4, 5/4, or 5/6; or 5YR 4/4, 4/6, 5/4, or 5/6. The texture is sandy loam or gravelly sandy loam. The content of rock fragments ranges from 15 to 35 percent. Most pedons are slightly brittle to strongly brittle.

Quaking Series

The Quaking series consists of very deep, well drained soils that formed in tephra deposited over basaltic lava flows. These soils are on lava plateaus and escarpments. Slopes range from 2 to 30 percent. The mean annual precipitation is 16 to 25 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Loamy-skeletal, mixed, superactive, mesic Andic Haploxeralfs

Typical Pedon

Quaking very gravelly loamy coarse sand, in an area of Kephart-Quaking complex, 2 to 15 percent slopes, about 6.3 miles southwest of Tionesta; 400 feet south and 1,500 feet west of the northeast corner of sec. 16, T. 43 N., R. 5 E., Timber Mountain SW (West of Kephart) quadrangle (7.5 minute series):

Oi—1 inch to 0; recent and decomposed pine litter.

A—0 to 3 inches; gray (10YR 5/1) very gravelly loamy coarse sand, very dark gray (10YR 3/1) moist; weak very fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; few very fine interstitial pores; 40 percent pumice gravel; moderately acid (pH 6.0); abrupt smooth boundary.

C—3 to 7 inches; white (10YR 8/1) extremely gravelly sand, white (10YR 8/2) moist; single grain; loose, nonsticky and nonplastic; many very fine and fine roots; few very fine interstitial pores; 90 percent pumice gravel; moderately acid (pH 6.0); abrupt wavy boundary.

Ab—7 to 14 inches; light brown (7.5YR 6/4) gravelly coarse sandy loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many fine and common medium and coarse roots; common very fine tubular pores; 30 percent gravel; slightly acid (pH 6.5); clear smooth boundary.

Btb1—14 to 21 inches; light brown (7.5YR 6/4) very gravelly sandy loam, brown or dark brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common medium and coarse roots; common very fine tubular pores; common thin clay films on faces of peds; 40 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Btb2—21 to 32 inches; light yellowish brown (10YR 6/4) extremely gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; common very fine tubular pores; common thin clay films on faces of peds; 70 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

BC—32 to 64 inches; light yellowish brown (10YR 6/4) extremely gravelly coarse sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few fine and medium roots; common very fine tubular pores; 60 percent gravel and 20 percent cobbles; slightly acid (pH 6.5).

The depth to bedrock is more than 60 inches. The particle-size control section (14 to 32 inches) ranges from 18 to 27 percent clay and from 35 to 80 percent rock fragments.

The A horizon has dry color of 10YR 5/1, 4/2, 5/2, or 5/3. Moist color is 10YR 3/1, 2/2, 3/2, or 3/3. The content of organic matter ranges from 6 to 9 percent. The content of clay ranges from 3 to 10 percent. The content of rock fragments, mostly pumice gravel, ranges from 35 to 60 percent. NaF pH ranges from 9.0 to 11.0. Reaction is moderately acid or slightly acid.

The C horizon has dry color of 10YR 7/1, 8/1, or 8/2. Moist color is 10YR 6/2, 7/2, or 8/2. The content of organic matter is 1 to 2 percent. The content of clay ranges from 1 to 5 percent. The content of rock fragments, mostly pumice gravel, ranges from 60 to 90 percent. NaF pH ranges from 9.0 to 11.0. Reaction is moderately acid or slightly acid.

The Ab horizon has dry color of 7.5YR 5/4 or 6/4. Moist color is 7.5YR 3/4 or 4/4. The content of organic matter is 1 to 2 percent. The content of clay ranges from 10 to 18 percent. The content of rock fragments, mostly gravel, ranges from 15 to 35 percent. NaF pH ranges from 8.8 to 10.0. Aluminum and $\frac{1}{2}$ iron by ammonium oxalate ranges from 1.0 to 1.5. Bulk density ranges from 0.9 to 1.0 g/cc.

The Btb horizon has dry color of 7.5YR 6/4 or 10YR 5/4 or 6/4. Moist color is 7.5YR 3/4 or 4/4 or 10YR 4/4. The content of organic matter is 0.5 to 1.0 percent. The texture is very gravelly sandy loam or extremely gravelly sandy clay loam. The content of clay ranges from 18 to 27 percent. The content of rock fragments, mostly gravel, ranges from 35 to 80 percent. NaF pH ranges from 8.8 to 9.5.

The BC horizon has dry color of 10YR 5/4 or 6/4. Moist color is 10YR 3/4 or 4/4. The content of organic matter is 0.1 to 0.3 percent. The content of clay ranges from 15 to 18 percent. The content of rock fragments, mostly gravel, ranges from 60 to 70 percent. The content of cobbles ranges from 5 to 20 percent. NaF pH ranges from 8.0 to 8.8.

Ravendale Series

The Ravendale series consists of deep, moderately well drained soils that formed in alluvium derived from extrusive igneous rock. These soils are in basins. Slopes range from 0 to 2 percent. The mean annual precipitation is 14 to 16 inches, and the mean annual temperature is about 44 to 48 degrees F.

Taxonomic classification: Fine, smectitic, mesic Chromic Haploxererts

Typical Pedon

Ravendale silty clay, 0 to 2 percent slopes, about 2 miles north of Little Valley Mill on the road to Clark Valley; approximately 1,580 feet west and 280 feet north of the southeast corner of sec. 33, T. 36 N., R. 7 E., Little Valley NW (Little Valley) quadrangle (7.5 minute series):

A—0 to 1 inch; grayish brown (10YR 5/2) silty clay, dark brown (10YR 4/3) moist; weak very fine and fine granular structure; soft, very friable, very sticky and very plastic; common very fine roots; many very fine interstitial pores; neutral (pH 7.0); abrupt smooth boundary.

Bss1—1 to 16 inches; brown (10YR 5/3) silty clay, dark brown (10YR 4/3) moist; strong coarse prismatic structure; hard, friable, very sticky and very plastic; common very fine roots; common very fine interstitial pores; thin continuous pressure faces and intersecting slickensides; neutral (pH 7.0); gradual wavy boundary.

Bss2—16 to 26 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; strong coarse prismatic

structure; hard, firm, very sticky and very plastic; common very fine roots; common very fine interstitial pores; thin continuous pressure faces and intersecting slickensides; slightly alkaline (pH 7.5); gradual wavy boundary.

Bss3—26 to 36 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; moderate coarse prismatic structure; hard, firm, very sticky and very plastic; few very fine and fine roots; common fine interstitial pores; thin continuous pressure faces and intersecting slickensides; slightly alkaline (pH 7.5); clear smooth boundary.

Bss4—36 to 48 inches; brown (10YR 5/3) clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium angular blocky structure; slightly hard, firm, sticky and plastic; few fine roots; few fine tubular pores; common moderately thick pressure faces and intersecting slickensides; 10 percent gravel and manganese concretions; moderately alkaline (pH 8.0); gradual wavy boundary.

Bt—48 to 57 inches; light brown (7.5YR 6/4) gravelly sandy loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; common very fine tubular pores; few thin clay films in bridges between mineral grains; 20 percent gravel and manganese concretions; slightly effervescent with dissimenated lime; moderately alkaline (pH 8.0); abrupt smooth boundary.

Cr—57 to 60 inches; lacustrine tuff with a thin discontinuous silica cap; stratified with very fine gravel and coarse sands.

The depth to lacustrine tuff and the depth to carbonates range from 40 to 60 inches. Vertical cracks $^{1}/_{2}$ inch to 4 inches wide extend to a depth of 20 to 50 inches. The cracks remain open from July through October and remain closed the rest of the year. Few or common intersecting slickensides are in the Bss horizons. The content of rock fragments on the surface, mostly gravel and cobbles, ranges from 0 to 5 percent.

The A horizon has dry color of 10YR 4/2, 5/2, or 5/3. Moist color is 10YR 3/2, 3/3, or 4/3. The content of clay ranges from 40 to 60 percent.

The Bss and Bt horizons have dry color of 10YR 5/2 or 5/3 or 7.5YR 6/4. Moist color is 10YR 4/2, 4/3, or 4/4 or 7.5YR 4/4.

Revit Series

The Revit series consists of moderately deep, somewhat excessively drained soils that formed in volcanic ash deposited over extrusive igneous rock. These soils are on mountains. Slopes range from 2 to 30 percent. The mean annual precipitation is 50 to 60 inches, and the mean annual temperature is 38 to 45 degrees F.

Taxonomic classification: Medial, mixed, frigid Humic Haploxerands

Typical Pedon

Revit fine sandy loam, 2 to 30 percent slopes, about 1$^{1}/_{4}$ miles southwest of Everitt Hill summit, 4 miles southeast of Mount Shasta City and 500 feet east-southeast of a microwave repeater; 300 feet south and 2,150 feet west of the northeast corner of sec. 30, T. 40 N., R. 3 W., Shasta SW (McCloud) quadrangle (7.5 minute series):

Oi—2 inches to 0; recent and partially decomposing needles, leaves, twigs, and other organic debris.

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic, weakly smeary; common very fine and medium roots; many very fine interstitial pores; 5 percent fine gravel; strongly acid (pH 5.4); clear smooth boundary.

A2—4 to 10 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic, weakly smeary; common very fine and coarse and many medium roots; common very fine interstitial pores; 10 percent fine gravel; moderately acid (pH 5.6); clear wavy boundary.

A3—10 to 20 inches; dark grayish brown (10YR 4/2) fine sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic, weakly smeary; common fine, medium, and coarse roots; few fine interstitial and tubular pores; 10 percent fine gravel; moderately acid (pH 5.6); gradual wavy boundary.

Bw1—20 to 27 inches; brown (10YR 5/3) gravelly fine sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic, weakly smeary; common fine and many medium roots; few fine interstitial and tubular pores; 25 percent fine gravel; moderately acid (pH 5.8); clear wavy boundary.

Bw2—27 to 30 inches; brown (10YR 5/3) gravelly fine sandy loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic, weakly smeary; common fine and

medium roots; few fine interstitial and tubular pores; 30 percent gravel; strongly acid (pH 5.5); abrupt wavy boundary.

2C—30 to 36 inches; brown (10YR 5/3) extremely stony fine sandy loam, dark yellowish brown (10YR 3/4) moist; massive; soft, very friable, nonsticky and nonplastic, weakly smeary; common fine and medium and few coarse roots; few fine interstitial and tubular pores; 85 percent rock fragments, mostly stones and gravel; strongly acid (pH 5.5); abrupt wavy boundary.

2R—36 inches; vesicular basalt, fractured in place; fractures are 6 to 8 inches apart.

The depth to lithic contact of hard fractured basalt or andesite ranges from 20 to 40 inches. Base saturation is less than 20 percent.

The A horizon has dry color of 10YR 5/3, 5/2, 5/1, 4/3, 4/2, 4/1, 3/3, or 3/2. Moist color is 10YR 3/3, 3/2, or 2/2 or 7.5YR 3/3. The content of rock fragments, mostly gravel or cobbles, ranges from 5 to 15 percent. Reaction ranges from strongly acid to slightly acid.

The Bw horizon has dry color of 10YR 5/3, 5/2, 4/4, 4/3, 4/2, or 3/4. Moist color is 10YR 5/3, 4/3, 4/2, 3/4, 3/3, or 3/2. The texture is fine sandy loam or sandy loam. The content of rock fragments, mostly gravel or cobbles, ranges from 10 to 35 percent. Reaction ranges from strongly acid to slightly acid.

The C horizon has dry color of 10YR 6/4, 5/4, or 5/3. Moist color is 10YR 3/4 or 4/4 or 7.5YR 4/4. The content of rock fragments, mostly cobbles and stones, ranges from 75 to 90 percent.

Ricketts Series

The Ricketts series consists of moderately deep, well drained soils that formed in colluvium derived from extrusive igneous rock. These soils are on hills. Slopes range from 2 to 50 percent. The mean annual precipitation is 12 to 20 inches, and the mean annual temperature is 47 to 49 degrees F

Taxonomic classification: Loamy-skeletal, mixed, superactive, mesic Pachic Argixerolls

Typical Pedon

Ricketts very cobbly loam, in an area of Ricketts-Orhood complex, 2 to 15 percent slopes, about 3 miles northeast on a dirt road from the community of Little Valley to the Deadhorse Canyon intersection, then 4 miles on a dirt road to Deadhorse Canyon; south 3,000 feet on the first road and upslope on the west slope of Bald Mountain; 800 feet off this dirt road; 1,300 feet east and 2,500 feet north of the southwest corner of sec. 26, T. 36 N., R. 7 E., Little Valley NW (Little Valley) quadrangle (7.5 minute series):

A1—0 to 5 inches; brown (10YR 5/3) very cobbly loam, dark brown (10YR 3/3) moist; moderate medium platy and weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine interstitial pores; 10 percent gravel, 30 percent cobbles, 5 percent stones; neutral (pH 7.0); clear wavy boundary.

A2—5 to 10 inches; dark brown (10YR 4/3) very cobbly loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium and common very fine roots; common very fine and fine tubular and interstitial pores; 15 percent gravel, 35 percent cobbles, 5 percent stones; neutral (pH 7.0); gradual wavy boundary.

Bt1—10 to 19 inches; dark brown (10YR 4/3) very cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, firm, slightly sticky and plastic; few very fine, fine, and medium roots; common fine and medium interstitial and tubular pores; few thin clay films on peds and in pores; 20 percent gravel, 30 percent cobbles, 5 percent stones; neutral (pH 7.0); clear smooth boundary.

Bt2—19 to 26 inches; dark yellowish brown (10YR 4/4) very cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, sticky and plastic; few fine and medium roots; few fine interstitial and tubular pores; few moderately thick clay films on peds; 15 percent gravel, 40 percent cobbles, 5 percent stones; neutral (pH 7.0); gradual wavy boundary.

R—26 to 31 inches; fractured flaggy basalt.

The depth to lithic contact ranges from 20 to 40 inches. Reaction is slightly acid or neutral throughout. Rock fragments on the surface include 10 to 15 percent gravel, 30 to 40 percent cobbles, and 0 to 2 percent stones with a combined range of 35 to 50 percent.

The A horizon has dry color of 10YR 4/3, 4/2, 5/3, or 5/2. Moist color is 10YR 3/2 or 3/3. The content of clay ranges from 15 to 20 percent. Rock fragments include 10 to 15 percent gravel, 30 to 40 percent cobbles, and 0 to 5 percent stones with a combined range of 35 to 50 percent.

The Bt horizon has dry color of 10YR 5/3, 4/4, or

4/3. Moist color is 10YR 3/3 or 3/2. The texture is very cobbly loam or very cobbly clay loam. The content of clay ranges from 25 to 30 percent. Rock fragments include 15 to 20 percent gravel, 30 to 40 percent cobbles, and 5 to 10 percent stones with a combined range of 35 to 60 percent.

The Ricketts soils in map units 295 and 296 are taxadjuncts because they have a thinner surface layer than is defined as the range for the series and are slightly cooler. These soils are classified as loamy-skeletal, mixed, superactive, frigid Typic Argixerolls.

Rivalier Series

The Rivalier series consists of moderately deep, well drained soils that formed in tephra. These soils are on mountains. Slopes range from 15 to 75 percent. The mean annual precipitation is 25 to 35 inches, and the mean annual temperature is 39 to 45 degrees F.

Taxonomic classification: Ashy-skeletal, mixed, frigid Typic Vitrixerands

Typical Pedon

Rivalier very gravelly sandy loam, 15 to 30 percent slopes, about 5 miles northwest of Bieber, about 150 feet west of sec. 12 SW center K-tag, upslope 20 feet from dirt road; 1,300 feet north and 1,300 feet east of the southwest corner of sec. 12, T. 38 N., R. 6 E., Bieber NW (Lookout) quadrangle (7.5 minute series):

Oi—3 inches to 0; partially decomposed pine and fir needles.

A—0 to 4 inches; brown (10YR 5/3) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine tubular pores; 35 percent gravel and 10 percent cobbles; slightly acid (pH 6.9); clear smooth boundary.

Bw1—4 to 18 inches; light yellowish brown (10YR 6/4) very gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine and common coarse roots; many very fine tubular pores; 40 percent gravel and 15 percent cobbles; slightly acid (pH 6.7); clear wavy boundary.

Bw2—18 to 27 inches; very pale brown (10YR 7/4) extremely gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few very fine and medium roots; common very fine and fine tubular pores; 40 percent gravel and 20 percent cobbles; acid (pH 6.5); clear wavy boundary.

2R—27 inches; tuff with cracks $^{1}/_{2}$ inch to 3 inches apart; less than 10 percent soil in cracks $^{1}/_{8}$ to $^{1}/_{2}$ inch apart.

The depth to lithic contact ranges from 20 to 40 inches. The content of rock fragments on the surface, mostly gravel, ranges from 35 to 50 percent. NaF pH is 9.0 to 11.0. Reaction is slightly acid or moderately acid. Base saturation by sum of cations ranges from 40 to 50 percent. Moist bulk density ranges from 0.6 to 0.85 g/cc to a depth of 18 inches.

The A horizon has dry color of 10YR 5/3 or 5/4. Moist color is 10YR 3/2 or 3/3. The content of organic matter ranges from 5 to 7 percent. The content of gravel ranges from 30 to 45 percent, and the content of cobbles ranges from 5 to 10 percent. NaF pH is 10.0 to 11.5. Base saturation by sum of cations ranges from 60 to 70 percent. Base saturation by ammonium acetate ranges from 90 to 95 percent. The content of volcanic glass in the very fine sand fraction ranges from 65 to 75 percent.

The Bw horizon has dry color of 10YR 4/3, 5/4, 6/4, or 7/4 or 7.5YR 5/4. Moist color is 10YR 3/2, 3/3, 3/4, or 4/4 or 7.5YR 3/4. The content of organic matter is 1 to 2 percent. The content of gravel ranges from 25 to 45 percent, and the content of cobbles ranges from 10 to 20 percent. NaF pH ranges from 9 to 11. Base saturation by sum of cations ranges from 60 to 65 percent. Base saturation by ammonium acetate ranges from 70 to 80 percent. The content of volcanic glass in the very fine sand fraction ranges from 75 to 85 percent.

Roundbarn Series

The Roundbarn series consists of deep, well drained soils that formed in slope alluvium derived from tephra. These soils are on mountains. Slopes range from 5 to 50 percent. The mean annual precipitation is 20 to 30 inches, and the mean annual temperature is 39 to 45 degrees F.

Taxonomic classification: Loamy-skeletal, mixed, superactive, frigid Vitrandic Argixerolls

Typical Pedon

Roundbarn gravelly sandy loam, in an area of Roundbarn-Said complex, 15 to 30 percent slopes, about 2.7 miles west of Nubieber, on Big Valley Mountain 1.6 miles north of Highway 299 on a dirt logging road, 50 feet east of the road; 900 feet east

and 2,400 feet north of the southwest corner of sec. 36, T. 38 N., R. 6 E., Bieber SW (Bieber) quadrangle (7.5 minute series):

A1—0 to 2 inches; dark grayish brown (10YR 4/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak thick platy structure parting to weak coarse subangular blocky; slightly hard, very friable, slightly sticky and nonplastic; many very fine and common fine roots; many very fine interstitial pores; 15 percent gravel; neutral (pH 6.6); abrupt smooth boundary.

A2—2 to 10 inches; dark grayish brown (10YR 4/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse and medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine and common fine, medium, and coarse roots; many very fine interstitial pores; 10 percent gravel and 5 percent cobbles; neutral (pH 6.6); gradual wavy boundary.

2Bt1—10 to 24 inches; brown (7.5YR 4/2) very cobbly sandy loam, dark brown (7.5YR 3/2) moist; weak coarse and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and common fine, medium, and coarse roots; common very fine tubular pores; common thin clay films in bridges between mineral grains and in pores; 20 percent cobbles, 10 percent stones, 10 percent gravel; neutral (pH 6.6); gradual wavy boundary.

2Bt2—24 to 41 inches; brown (7.5YR 4/2) very cobbly sandy clay loam, dark brown (7.5YR 3/2) moist; weak coarse and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common very fine tubular pores; many thin clay films in bridges between mineral grains and in pores; few thin clay films on peds; 30 percent cobbles and 15 percent gravel; neutral (pH 6.8); clear wavy boundary.

2Bt3—41 to 50 inches; brown (7.5YR 4/2) very cobbly sandy loam, dark brown (7.5YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine and medium roots; common very fine tubular pores; many thin clay films in bridges between mineral grains and in pores; 30 percent cobbles and 15 percent gravel; neutral (pH 6.8); clear wavy boundary.

3Crt—50 inches; highly weathered basalt; clay films lining cracks and fractures.

The depth to paralithic contact ranges from 40 to 60 inches. Base saturation ranges from 59 to 73 percent. The content of organic matter ranges from 1 to 5 percent to a depth of 30 to 50 inches.

The A horizon has dry color of 10YR 5/3, 5/2, 4/3, or 4/2 or 7.5YR 5/4, 4/4, or 4/2. Moist color is 10YR 3/2 or 2/2, 7.5YR 3/2, or 5YR 3/3 or 3/2. The content of rock fragments ranges from 15 to 35 percent. Aluminum and $^1/_2$ iron by ammonium oxalate ranges from 0.4 to 1.0. The content of volcanic glass ranges from 5 to 15 percent.

The 2Bt horizon has dry color of 10YR 4/3 or 4/4 or 7.5YR 5/4, 5/2, 4/4, or 4/2. Moist color is 10YR 2/2 or 3/2, 7.5YR 3/2 or 3/4, or 5YR 3/3 or 3/4. The content of clay ranges from 15 to 27 percent and averages 18 to 25 in the particle-size control section. The content of rock fragments ranges from 35 to 60 percent.

Said Series

The Said series consists of deep, well drained soils that formed in basalt. These soils are on mountains. Slopes range from 5 to 50 percent. The mean annual precipitation is 16 to 30 inches, and the mean annual temperature is 39 to 45 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, frigid Vitrandic Argixerolls

Typical Pedon

Said gravelly loam, in an area of Roundbarn-Said complex, 15 to 30 percent slopes, 2.5 miles northeast of McArthur; 1,050 feet south and 100 feet west of the northeast corner of sec. 3, T. 38 N., R. 6 E., Fall River Mills NE (Day) quadrangle (7.5 minute series):

A1—0 to 3 inches; grayish brown (10YR 5/2) gravelly loam, dark brown (7.5YR 3/2) moist; weak medium platy structure parting to moderate fine granular; soft, very friable, nonsticky and nonplastic; many very fine and few fine roots; common very fine and fine interstitial pores; 15 percent rounded gravel; moderately acid (pH 6.0); clear smooth boundary.

A2—3 to 8 inches; brown (10YR 5/3) gravelly loam, dark brown (7.5YR 3/2) moist; weak thick platy structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; common very fine and few fine tubular pores; 15 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

Bt1—8 to 20 inches; brown (7.5YR 5/4) gravelly loam, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and few fine, medium, and coarse roots; common very fine and few fine tubular pores; many thin clay films in pores; 15 percent gravel and 5 percent cobbles; moderately acid (pH 6.0); clear wavy boundary.

Bt2—20 to 41 inches; brown (7.5YR 5.2) gravelly loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; hard, very friable, sticky and plastic; common very fine, fine, medium, and coarse roots; many very fine and few fine tubular pores; many thin clay films in pores and common thin clay films on faces of peds; 15 percent gravel and 10 percent cobbles; moderately acid (pH 6.0); clear wavy boundary.

2Bt3—41 to 55 inches; brown (7.5YR 5/2) very cobbly clay loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; hard, very friable, sticky and plastic; common very fine and few fine roots; many thin clay films in pores and common thin clay films on peds; 30 percent gravel and 30 percent cobbles; moderately acid (pH 6.0); abrupt wavy boundary.

Cr—55 inches; highly weathered basalt.

The depth to bedrock ranges from 40 to 60 inches. The average content of clay in the control section is 20 to 25 percent. The content of rock fragments, mostly gravel, ranges from 20 to 25 percent.

The A horizon has dry color of 10YR 5/2 or 5/3. Moist color is 10YR 2/2 or 7.5YR 3/2. The content of clay ranges from 15 to 20 percent. The content of rock fragments, mostly gravel, ranges from 15 to 25 percent.

The Bt horizon has dry color of 7.5YR 5/2 or 5/4. Moist color is 7.5YR or 5YR 3/3. In the upper part, the content of clay ranges from 20 to 25 percent and the content of rock fragments ranges from 15 to 30 percent. In the lower part, the content of clay ranges from 27 to 35 percent and the content of rock fragments ranges from 35 to 60 percent.

Scarface Series

The Scarface series consists of very deep, well drained soils that formed in tephra. These soils are on lava plateaus and hills. Slopes range from 2 to 50 percent. The mean annual precipitation is 25 to 50 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Medial, mixed, mesic Alfic Vitrixerands

Typical Pedon

Scarface sandy loam, in an area of Scarface-Gasper complex, 2 to 15 percent slopes, about 7.25 miles north of Day to the intersection of Lookout-Hackamore Road and Loveness Logging Road, 14 miles southwest on Loveness Logging Road, 0.3 mile south on road 9.71L, 75 feet west of the road; 1,800 feet east and 1,500 feet north of the southwest corner of sec. 4, T. 40 N., R. 5 E., Whitehorse SW (Whitehorse) quadrangle (7.5 minute series):

Oi—2 inches to 0; partially decomposed white fir and white pine needles; abrupt smooth boundary.

A1—0 to 4 inches; dark yellowish brown (10YR 4/4) sandy loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; 10 percent gravel; slightly acid (pH 6.2); clear smooth boundary.

A2—4 to 10 inches; strong brown (7.5YR 5/6) sandy loam, dark reddish brown (5YR 3/4) moist; moderate fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; 10 percent gravel; slightly acid (pH 6.2); clear smooth boundary.

2Bw—10 to 16 inches; strong brown (7.5YR 5/6) sandy loam, dark reddish brown (5YR 3/4) moist; moderate fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common medium and few very fine roots; many very fine interstitial pores; 10 percent gravel; slightly acid (pH 6.2); clear smooth boundary.

2Bt1—16 to 24 inches; strong brown (7.5YR 5/6) sandy loam, dark reddish brown (5YR 3/4) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; many coarse and common medium roots; common very fine tubular pores; few thin clay films in pores; 10 percent gravel; slightly acid (pH 6.2); clear smooth boundary.

2Bt2—24 to 37 inches; strong brown (7.5YR 5/6) gravelly sandy clay loam, dark brown (7.5YR 3/4) moist; moderate fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine and medium roots; many very fine and coarse tubular pores; many thin clay films in pores and common thin clay films on faces of peds; 20 percent gravel; slightly acid (pH 6.2); gradual smooth boundary.

2Bt3—37 to 52 inches; yellowish brown (10YR 5/6) gravelly sandy clay loam, dark yellowish brown (10YR 3/4) moist; moderate fine angular blocky

structure; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; few very fine tubular pores; many thick clay films in pores and common thick clay films on faces of peds; 20 percent gravel and 10 percent cobbles; slightly acid (pH 6.2); gradual smooth boundary.

2Bt4—52 to 65 inches; yellowish brown (10YR 5/6) gravelly sandy clay loam, dark yellowish brown (10YR 3/4) moist; moderate fine angular blocky structure; very hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; few very fine tubular pores; many thick clay films in pores and common thick clay films on faces of peds; 30 percent gravel; slightly acid (pH 6.2); gradual wavy boundary.

2Bt5—65 to 84 inches; brownish yellow (10YR 6/6) gravelly clay loam, dark yellowish brown (10YR 4/4) moist; moderate fine angular blocky structure; very hard, firm, sticky and plastic; few very fine and fine roots; few very fine tubular pores; many thick clay films in pores and on faces of peds; 30 percent gravel; slightly acid (pH 6.2).

The particle-size control section (16 to 36 inches) averages 18 to 27 percent clay. The content of rock fragments, mostly gravel, ranges from 15 to 20 percent. Base saturation by sum of cations ranges from 35 to 50 percent. The content of organic matter ranges from 1.1 to 6.0 percent to a depth of 16 inches. Reaction is slightly acid or neutral.

The A horizon has dry color of 10YR 4/4 or 5/4; 7.5YR 4/4, 5/4, 5/3, or 5/6; or 5YR 3/4 or 4/4. Moist color is 10YR 2/2 or 3/2, 7.5YR 3/2 or 3/4, or 5YR 3/3 or 3/4. The content of rock fragments, mostly gravel, ranges from 10 to 15 percent. NaF pH is 11.5 to 10.3.

The 2Bw horizon has dry color of 7.5YR 5/4 or 5/6 or 5YR 4/4. Moist color is 5YR 3/4 or 4/4 or 7.5YR 3/4 or 4/4. The content of rock fragments, mostly gravel, ranges from 10 to 15 percent. NaF pH is 10.5 to 9.9.

The upper part of the 2Bt horizon has dry color of 7.5YR 5/4 or 5/6; 5YR 4/4, 4/6, or 5/4; or 10YR 5/6 or 6/6. Moist color is 10YR 3/4 or 4/4; 7.5YR 3/4, 4/4, or 4/6; or 5YR 3/4 or 4/4. The content of gravel ranges from 5 to 20 percent, and the content of cobbles ranges from 5 to 10 percent. NaF pH is 9.5 to 10.0.

The lower part of the Bt horizon has dry color of 10YR 5/6 or 6/6 or 7.5YR 6/4 or 5/6. Moist color is 10YR 4/4 or 7.5YR 3/4, 4/4, or 4/6. The content of rock fragments, mostly gravel, ranges from 20 to 30 percent. NaF pH is 9.5 to 9.8.

Searvar Series

The Searvar series consists of moderately deep, well drained soils that formed in material weathered from extrusive igneous rock. These soils are on lava plateaus and hills. Slopes range from 2 to 30 percent. The mean annual precipitation is 12 to 18 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Loamy-skeletal, mixed, superactive, mesic Aridic Argixerolls

Typical Pedon

Searvar gravelly loam, in an area of Dotta-Searvar complex, 2 to 15 percent slopes, about 15 miles south of Adin and 1.5 miles northeast of Silva Flat Reservoir and 60 feet west of a dirt road; 775 feet east and 400 feet south of the center of sec. 7, T. 36 N., R. 10 E., Hayden Hill NE (Said Valley) quadrangle (7.5 minute series):

A1—0 to 3 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak thin platy structure parting to moderate fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine and few medium roots; common very fine and fine and few medium tubular pores; 15 percent andesitic gravel; neutral (pH 7.0); clear smooth boundary.

A2—3 to 6 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate thin platy structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine and few medium roots; common very fine and fine tubular pores and few medium interstitial pores; 15 percent andesitic gravel; neutral (pH 7.0); clear smooth boundary.

BAt—6 to 18 inches; brown (10YR 5/3) very cobbly loam, dark brown (10YR 3/3) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine and few fine and medium roots; common very fine and few fine and medium tubular pores; very few clay films on faces of peds; 15 percent andesitic gravel and 25 percent andesitic cobbles; neutral (pH 7.0); abrupt wavy boundary.

Bt—18 to 28 inches; pale brown (10YR 6/3) very cobbly loam, brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine and

medium roots; few very fine and fine tubular pores; very few thin clay films on faces of peds; 25 percent andesitic cobbles and 15 percent andesitic gravel; neutral (pH 7.0); abrupt smooth boundary.

Cr—28 to 53 inches; very pale brown (10YR 7/3), weathered tuff, yellowish brown (10YR 5/4) moist; massive; hard, friable, very weak rupture resistance, brittle by silica; few very fine and fine roots in cracks; few very fine and fine tubular pores; disoriented rock fragments in a soft, degrading tuff matrix; 20 percent andesitic gravel and 60 percent andesitic cobbles; neutral (pH 7.0); clear smooth boundary.

R—53 inches; continuous, dense, unweathered tuff cementing semirounded and angular andesite and basalt rock fragments that are difficult to chip with a shovel.

The depth to paralithic contact ranges from 20 to 40 inches. The particle-size control section ranges from 18 to 25 percent clay. The content of rock fragments, mostly cobbles and gravel, ranges from 40 to 55 percent.

The A horizon has dry color of 10YR 4/2, 4/3, 5/2, 5/3, or 5/4. Moist color is 10YR 3/2 or 7.5YR 3/2. The content of organic matter ranges from 2 to 6 percent. The content of clay ranges from 10 to 15 percent. The content of rock fragments, mostly gravel, ranges from 15 to 25 percent. Reaction is neutral or slightly acid. Base saturation by ammonium acetate ranges from 90 to 100 percent.

The Bt horizon has dry color of 10YR 5/3, 5/4, 6/3, or 6/4 or 7.5YR 5/4. Moist color is 10YR 3/3 or 4/3, 7.5YR 3/2, or 5YR 3/2 or 4/4. The content of organic matter is 0.5 to 1.0 percent. The content of clay ranges from 18 to 25 percent. The content of rock fragments, mostly cobbles, ranges from 35 to 60 percent. Base saturation by ammonium acetate ranges from 95 to 100 percent.

The Searvar soil in map unit 296 is a taxadjunct because it is slightly cooler than is defined as the range for the series. This soil is classified as loamy-skeletal, mixed, superactive, frigid Aridic Argixerolls.

Shasta Series

The Shasta series consists of very deep, somewhat excessively drained soils that formed in glacial outwash derived from extrusive igneous rock. These soils are on glacial outwash plains and fans. Slopes range from 0 to 9 percent. The mean annual precipitation is 35 to 60 inches, and the mean annual temperature is 47 to 50 degrees F.

Taxonomic classification: Ashy, mixed, superactive, mesic Humic Vitrixerands

Typical Pedon

Shasta loamy sand, 0 to 5 percent slopes, about 5 miles east of McCloud, 0.3 mile east of Fowler campground road, 50 feet north of logging road 24KG; 3,700 feet north and 1,700 feet west of the southeast corner of sec. 1, T. 39 N., R. 2 W., Shasta SE (Elk Spring) quadrangle (7.5 minute series):

Oi1—4 inches to 1 inch; recent and slightly decomposed needles, leaves, bark, twigs, and other organic debris; abrupt smooth boundary.

Oi2—1 inch to 0; partially decomposed needles, leaves, twigs, bark, and other organic debris; abrupt smooth boundary.

A1—0 to 5 inches; very dark grayish brown (10YR 3/2) loamy sand, black (N 2/0) moist; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine interstitial pores; strongly acid (pH 5.5); abrupt smooth boundary.

A2—5 to 13 inches; very dark grayish brown (10YR 3/2) loamy sand, black (10YR 2/1) moist; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine interstitial pores; strongly acid (pH 5.5); clear smooth boundary.

A3—13 to 22 inches; dark grayish brown (10YR 4/2) loamy sand, black (10YR 2/1) moist; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and many medium and coarse roots; many very fine interstitial pores; strongly acid (pH 5.5); clear smooth boundary.

2C1—22 to 30 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist; very weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and many medium and coarse roots; strongly acid (pH 5.5); abrupt wavy boundary.

3C2—30 to 39 inches; pale brown (10YR 6/3) very gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; massive; hard, firm, nonsticky and nonplastic; common very fine, fine, and medium roots; many very fine random interstitial pores; 70 percent rounded gravel; very weakly and discontinuously cemented with volcanic glass; moderately acid (pH 5.8); abrupt wavy boundary.

4C3—39 to 50 inches; gray (10YR 5/1) gravelly sand, dark brown (10YR 3/3) moist; single grain; slightly hard, loose, nonsticky and nonplastic; few fine and very fine roots; many very fine interstitial pores; 25 percent rounded gravel; moderately acid (pH 5.9); abrupt wavy boundary.
5C4—50 to 60 inches; gray (10YR 5/1) sand, dark brown (10YR 3/3) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; 10 percent rounded gravel; moderately acid (pH 5.9); abrupt wavy boundary.
5C5—60 to 70 inches; gray (10YR 5/1) sand; 70 percent black (10YR 2/1) and 30 percent dark brown (10YR 3/3) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; moderately acid (pH 5.8).

The depth to sand or gravelly sand ranges from 20 to 40 inches. Gravel make up 0 to 35 percent of the upper part. The lower part may have layers of silt-sized glacial material 1 to 4 inches thick. The substratum below a depth of 40 inches may be as much as 80 percent gravel in some pedons.

The A horizon has dry color of 10YR 3/1, 3/2, 3/3, 3/4, 4/1, 4/2, 4/3, 4/4, 5/1, 5/2, 5/3, or 5/4. Moist color is N 2/0 or 10YR 1/1, 1/2, 1/3, 2/1, 2/2, 2/3, 3/1, 3/2, or 3/3. The texture is loamy sand or loamy fine sand or the gravelly analogs of these textures. The soil material has very fine granular structure or is single grain or massive. Reaction is strongly acid or moderately acid.

The C horizon has dry color of 10YR or 2.5YR 5/1, 5/2, 5/3, 5/4, 6/1, 6/2, 6/3, 6/4, 7/1, 7/2, 7/3, or 7/4. Moist color is 10YR or 2.5Y 2/1, 3/1, 3/2, 3/3, 4/1, 4/2, or 4/3. The texture is loamy sand or sand or the gravelly or very gravelly analogs of these textures. Reaction ranges from very strongly acid to moderately acid. The C horizon is stratified.

Shastina Series

The Shastina series consists of very deep, well drained soils that formed in glacial outwash derived from extrusive igneous rock. These soils are on glacial outwash plains. Slopes range from 0 to 5 percent. The mean annual precipitation is 40 to 60 inches, and the mean annual temperature is 45 to 50 degrees F.

Taxonomic classification: Medial over sandy or sandy-skeletal, mixed, mesic Humic Haploxerands

Typical Pedon

Shastina loam, 0 to 5 percent slopes, about 1/2 mile north of McCloud, 200 feet north of the McCloud airstrip entrance road and 100 feet east of the airstrip clearing; 1,200 feet south and 1,200 feet west of the northeast corner of sec. 31, T. 40 N., R. 2 W., Shasta SE (Elk Spring) quadrangle (7.5 minute series):

Oi—4 inches to 0; slightly decomposed litter.
A1—0 to 6 inches; dark brown (10YR 3/3) loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic, weakly smeary; many very fine and fine roots; many very fine interstitial pores; 8 percent fine gravel; moderately acid (pH 5.9); clear smooth boundary.
A2—6 to 15 inches; dark brown (10YR 4/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic, weakly smeary; many very fine and fine roots; many very fine and common fine interstitial pores; 15 percent fine gravel; slightly acid (pH 6.1); gradual smooth boundary.
2AC—15 to 26 inches; brown (10YR 5/3) very cobbly sandy loam, dark brown (10YR 3/3) moist; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic, weakly smeary; many very fine and fine and common coarse roots; common very fine interstitial pores; 35 percent gravel and 20 percent cobbles; slightly acid (pH 6.2); clear smooth boundary.
2C1—26 to 36 inches; yellowish brown (10YR 5/4) extremely cobbly sandy loam, dark yellowish brown (10YR 3/4) moist; weak fine subangular blocky structure; soft, loose, nonsticky and nonplastic; many very fine and fine and few coarse roots; many very fine interstitial pores; 40 percent gravel and 30 percent cobbles; slightly acid (pH 6.1); gradual smooth boundary.
3C2—36 to 60 inches; brown (10YR 5/3) and light gray (10YR 7/1) extremely cobbly loamy coarse sand, grayish brown (10YR 5/2) and gray (10YR 5/1) moist; single grain; loose, nonsticky and nonplastic; common medium roots; common very fine interstitial pores; 40 percent gravel, 35 percent cobbles, 5 percent stones; moderately acid (pH 6.0).

The depth to cobbly outwash material ranges from 15 to 30 inches. Base saturation ranges from 5 to 30 percent. The depth to the 3C2 horizon ranges from 30 to 36 inches.

The A horizon has dry color of 10YR 5/4, 4/4, 4/3, 4/2, 3/3, or 3/2. Moist color is 10YR 3/3, 3/2, or 2/2. The texture is loam, fine sandy loam, gravelly fine

sandy loam, or gravelly sandy loam. The content of rock fragments, mostly gravel, ranges from 5 to 35 percent. Bulk density ranges from 0.85 to 0.95 g/cc.

The 2C horizon has dry color of 10YR 4/3, 4/4, 5/2, 5/3, or 5/4. Moist color is 10YR 3/2, 3/3, or 3/4. The texture is very cobbly sandy loam or extremely cobbly sandy loam. The content of coarse fragments, mostly gravel or cobbles, ranges from 35 to 80 percent.

The 3C2 horizon has dry color of 10YR 5/3, 6/1, 6/3, 6/4, 7/1, or 7/3. Moist color is 10YR 4/2, 4/3, 4/4, 5/1, 5/2, or 5/4.

Splawn Series

The Splawn series consists of moderately deep, well drained soils that formed in material weathered from basalt. These soils are on hills and plateaus. Slopes range from 2 to 50 percent. The mean annual precipitation is 12 to 20 inches, and the mean annual temperature is 45 to 50 degrees F.

Taxonomic classification: Clayey-skeletal, smectitic, mesic Ultic Argixerolls

Typical Pedon

Splawn very cobbly loam, in an area of Splawn-Jellico complex, 5 to 15 percent slopes, about 1.3 miles northeast of Cassel on Cassel-Fall River Road, north 1.2 miles on dirt road to Conrad Ranch, 900 feet southeast on dirt road and 500 feet east of the road; 200 feet east and 1,900 feet south of the northwest corner of sec. 34, T. 36 N., R. 4 E., Burney NE (Cassel) quadrangle (7.5 minute series):

Oi—1 inch to 0; recent and decomposing oak and pine litter.

A1—0 to 3 inches; brown (10YR 5/3) very cobbly loam, dark brown (10YR 3/3) moist; strong fine granular and moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; common fine tubular pores; 30 percent cobbles, 20 percent gravel; neutral (pH 6.8); clear smooth boundary.

A2—3 to 10 inches; dark brown (10YR 4/3) very gravelly loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common fine tubular pores; 45 percent gravel and 10 percent cobbles; neutral (pH 6.8); clear wavy boundary.

Bt1—10 to 17 inches; dark brown (7.5YR 4/4) very gravelly clay loam, dark brown (10YR 3/3) moist; strong fine subangular blocky structure; very hard, friable, sticky and plastic; few very fine, fine, and medium roots; common fine tubular pores; common moderately thick clay films in pores and many thin clay films on peds; 50 percent gravel and 5 percent cobbles; neutral (pH 6.8); clear irregular boundary.

Bt2—17 to 24 inches; strong brown (7.5YR 4/6) extremely gravelly clay loam, dark brown (7.5YR 3/4) moist; strong fine angular blocky structure; very hard, firm, sticky and plastic; few very fine and fine and common medium roots; few fine tubular pores; many moderately thick clay films in pores and on peds; 60 percent gravel and 10 percent cobbles; neutral (pH 6.8); abrupt wavy boundary.

R—24 inches; basalt with few fractures.

The mollic epipedon ranges from 14 to 20 inches in thickness and includes the upper part of the Bt horizon. The depth to bedrock ranges from 20 to 40 inches. The content of rock fragments on the surface, mostly cobbles, ranges from 35 to 50 percent. Base saturation by sum of cations ranges from 60 to 75 percent.

The A horizon has dry color of 10YR 5/3, 5/2, 4/3, or 4/2. Moist color is 10YR 3/3, 3/2, or 2/2 or 7.5YR 3/2. The content of clay ranges from 18 to 27 percent. The content of rock fragments ranges from 35 to 60 percent by volume. The content of gravel ranges from 20 to 50 percent, and the content of cobbles ranges from 10 to 30 percent.

The Bt horizon has dry color of 7.5YR 4/4 or 5/4 or 5YR 4/4, 4/3, or 3/3 in the upper part and 7.5YR 4/6, 4/4, or 5/4 in the lower part. Moist color is 10YR 3/3, 7.5YR 3/2, or 5YR 3/3 or 3/4 in the upper part and 5YR 3/4 or 7.5YR 3/4 in the lower part. The texture is very gravelly clay loam, extremely gravelly clay loam, or extremely gravelly clay. The content of clay ranges from 35 to 50 percent. The content of rock fragments ranges from 40 to 80 percent. The content of gravel ranges from 35 to 75 percent, and the content of cobbles ranges from 5 to 40 percent.

Stacher Series

The Stacher series consists of very deep, well drained soils that formed in tephra. These soils are on mountains. Slopes range from 2 to 50 percent. The mean annual precipitation is 35 to 50 inches, and the mean annual temperature is 39 to 41 degrees F.

Taxonomic classification: Medial over loamy-skeletal, mixed, superactive, frigid Typic Haploxerands

Typical Pedon

Stacher very gravelly coarse sandy loam, 30 to 50 percent slopes (fig. 18), about 7 miles southwest of

Burney; 1,000 feet north and 1,800 feet east of the southwest corner of sec. 22, T. 34 N., R. 2 E., Burney SW (Burney Mountain West) quadrangle (7.5 minute series):

Oi—3 inches to 0; recent and decomposed litter.

A—0 to 4 inches; brown (10YR 5/3) very gravelly coarse sandy loam, very dark brown (10YR 2/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; common very fine interstitial pores; 40 percent gravel; NaF pH 11.5; slightly acid (pH 6.2); abrupt smooth boundary.

Bw1—4 to 7 inches; light brown (7.5YR 6/4) gravelly coarse sandy loam, brown or dark brown (7.5YR 4/4) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; common very fine interstitial pores; 30 percent gravel; NaF pH 11.5; moderately acid (pH 6.0); clear smooth boundary.

Bw2—7 to 14 inches; light brown (7.5YR 6/4) gravelly coarse sandy loam, brown or dark brown (7.5YR 4/4) moist; weak very fine subangular blocky structure; soft, friable, nonsticky and nonplastic; common fine and few very fine and medium roots; common very fine interstitial pores; 30 percent gravel; NaF pH 10.0; moderately acid (pH 6.0); clear smooth boundary.

2Bw3—14 to 25 inches; light brown (7.5YR 6/4) very gravelly sandy clay loam, light brown (7.5YR 6/4) moist; weak very fine subangular blocky structure; soft, friable, nonsticky and slightly plastic; common fine and medium and few very fine and coarse roots; common very fine interstitial pores; 45 percent gravel; NaF pH 10.5; moderately acid (pH 5.8); gradual wavy boundary.

2Bw4—25 to 47 inches; very pale brown (10YR 7/4) extremely gravelly sandy clay loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; soft, friable, nonsticky and slightly plastic; common fine and medium and few coarse and very fine roots; common very fine interstitial pores; 50 percent gravel and 20 percent cobbles; NaF pH 10.0; moderately acid (pH 5.9); clear smooth boundary.

2Bw5—47 to 65 inches; very pale brown (10YR 7/4) extremely gravelly sandy clay loam, yellowish brown (10YR 5/4) moist; weak very fine subangular blocky structure; soft, friable, nonsticky and slightly plastic; few fine and medium roots; common very fine interstitial pores; 60 percent gravel and 20 percent cobbles; NaF pH 10.0; moderately acid (pH 5.9); abrupt smooth boundary.

3Cr—65 inches; soft, weathered andesite porphyry.

The depth to paralithic contact is more than 60 inches. The mineralogy is dominated by allophane. The clay fraction has gibbsitic mineralogy.

The A horizon has dry color of 10YR 4/2 or 5/3 or 7.5YR 5/4. Moist color is 10YR 2/2 or 3/2 or 7.5YR 3/2. The content of organic matter ranges from 8 to 10 percent. The texture is very gravelly coarse sandy loam or gravelly coarse sandy loam. The content of rock fragments, mostly andesitic porphyry gravel, ranges from 15 to 60 percent. NaF pH ranges from 10.5 to 12.0. Base saturation by ammonium acetate ranges from 30 to 35 percent. Reaction is slightly acid or moderately acid. Bulk density is 0.3 to 0.6 g/cc.

The Bw1 and Bw2 horizons have dry color of 10YR 6/3, 6/4, or 8/4 or 7.5YR 6/4, 7/4, or 8/4. Moist color is 10YR 4/4 or 5/4 or 7.5YR 4/4, 4/6, or 6/4. The content of organic matter ranges from 2 to 5 percent. The content of rock fragments, mostly andesitic porphyry gravel, ranges from 20 to 35 percent. NaF pH ranges from 10.5 to 11.5. Base saturation by ammonium acetate ranges from 10 to 15 percent. Reaction is slightly acid or moderately acid. Bulk density is 0.5 to 0.85.

The 2Bw3 and 2Bw4 horizons have dry color of 10YR 6/3, 6/4, 7/4, or 8/4 or 7.5YR 6/4, 7/4, or 8/4. Moist color is 10YR 4/4 or 5/4 or 7.5YR 4/4, 4/6, or 6/4. The content of organic matter ranges from 0.5 to 2.0 percent. The content of clay ranges from 20 to 25 percent. The content of fragments of andesitic porphyry ranges from 45 to 70 percent. NaF pH ranges from 10.5 to 11.5. Base saturation by ammonium acetate ranges from 3 to 9 percent. Reaction is slightly acid or moderately acid. Bulk density is 1.0 to 1.1 g/cc.

The 2Bw5 horizon has dry color of 10YR 7/4, 8/2, or 8/3. Moist color is 10YR 5/4, 6/3, or 6/4. The content of organic matter ranges from 0.5 to 2.0 percent. The content of clay ranges from 20 to 25 percent. The content of fragments of andesitic porphyry ranges from 60 to 90 percent. NaF pH ranges from 9.5 to 10.0. Base saturation by ammonium acetate ranges from 3 to 5 percent. Reaction is moderately acid or strongly acid. Bulk density is 1.0 to 1.1 g/cc.

Stoner Series

The Stoner series consists of very deep, well drained soils that formed in alluvium derived from metamorphic and igneous rock. These soils are on

fan terraces. Slopes range from 2 to 15 percent. The mean annual precipitation is 12 to 30 inches, and the mean annual temperature is 47 to 51 degrees F.

Taxonomic classification: Coarse-loamy, mixed, active, mesic Typic Xerochrepts

Typical Pedon

Stoner gravelly sandy loam, 2 to 15 percent slopes, about 2 miles south of McCloud on the Johnson Ranch; 1,900 feet south and 850 feet east of the northwest corner of sec. 25, T. 39 N., R. 3 W., Shoeinhorse Mountain NW (Girard Ridge) quadrangle (7.5 minute series):

Oi—1 inch to 0; recent and partially decomposed needles, leaves, twigs, and other organic debris.

A1—0 to 3 inches; dark grayish brown (10YR 4/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate very fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; common fine interstitial pores; 30 percent gravel; moderately acid (pH 6.0); abrupt smooth boundary.

A2—3 to 6 inches; yellowish brown (10YR 5/4) gravelly sandy loam, dark brown (10YR 3/3) moist; strong very fine and fine subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common very fine and fine roots; common fine interstitial and tubular and common very fine tubular pores; 30 percent gravel; moderately acid (pH 6.0); abrupt smooth boundary.

Bt1—6 to 12 inches; brown (10YR 5/3) gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and slightly plastic; common very fine and fine roots; common fine tubular pores; 25 percent gravel; moderately acid (pH 6.0); clear smooth boundary.

Bt2—12 to 22 inches; brown (10YR 5/3) gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and few very fine roots; common fine tubular pores; 25 percent gravel; slightly acid (pH 6.3); clear smooth boundary.

Bt3—22 to 35 inches; brownish yellow (10YR 6/6) gravelly loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and few very fine roots; few fine tubular pores; 25 percent gravel; slightly acid (pH 6.3); gradual smooth boundary.

Bt4—35 to 42 inches; reddish yellow (7.5YR 6/6) gravelly loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; few fine and medium roots; common fine tubular pores; 30 percent gravel; slightly acid (pH 6.3); gradual wavy boundary.

C—42 to 74 inches; light yellowish brown (10YR 6/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine and medium roots; common fine tubular pores; 40 percent gravel; slightly acid (pH 6.3).

The depth to bedrock is more than 60 inches. The particle-size control section (10 to 40 inches) ranges from 10 to 15 percent clay and from 15 to 30 percent rock fragments, mostly gravel. The content of rock fragments on the surface, mostly gravel, ranges from 20 to 30 percent.

The A horizon has dry color of 10YR 4/2, 4/3, or 5/4 or 7.5YR 5/4. Moist color is 10YR 3/2 or 3/3. The content of organic carbon ranges from 0.5 to 1.5 percent. The content of clay ranges from 10 to 17 percent. The content of rock fragments, mostly gravel, ranges from 15 to 35 percent. Reaction is moderately acid or slightly acid.

The B horizon has dry color of 10YR 5/3, 5/4, 6/4, or 6/6 or 7.5YR 5/4, 6/4, or 6/6. Moist color is 10YR 3/4 or 4/4 or 7.5YR 4/4. The content of organic carbon ranges from 0.3 to 0.6 percent. The texture is gravelly loam or gravelly sandy loam. The content of clay ranges from 9 to 17 percent. The content of rock fragments, mostly gravel, ranges from 15 to 35 percent. Reaction is moderately acid or slightly acid.

The C horizon has dry color of 10YR 5/3, 5/4, 6/4, or 6/6 or 7.5YR 5/4, 6/4, or 6/6. Moist color is 10YR 4/4 or 5/6 or 7.5YR 4/4, 4/6, or 5/8. The texture is very gravelly sandy loam. The content of rock fragments, mostly gravel, ranges from 35 to 50 percent. In some pedons the C horizon is stratified with various textures and with various quantities of rock fragments.

Stukel Series

The Stukel series consists of shallow, well drained soils that formed in slope alluvium derived from pumiceous tuff. These soils are on shoulders of hills and adjacent to rock outcrops. Slopes range from 2 to 30 percent. The mean annual precipitation is 14 to

16 inches, and the mean annual temperature is 46 to 48 degrees F.

Taxonomic classification: Loamy, mixed, superactive, mesic Lithic Haploxerolls

Typical Pedon

Stukel gravelly sandy loam, in an area of Stukel complex, 15 to 30 percent slopes, about 9.5 miles northeast of Little Valley, 0.3 mile south of a pumiceous cinder pit, 50 feet west of an unimproved road; 100 feet north and 250 feet west of the southeast corner of sec. 35, T. 36 N., R. 8 E., Little Valley NE (Dixie Peak) quadrangle (7.5 minute series):

A1—0 to 4 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak very thin platy structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial and few very fine tubular pores; 15 percent gravel and 5 percent cobbles; neutral (pH 7.0); clear smooth boundary.

A2—4 to 16 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate very thin platy structure parting to weak medium subangular blocky; soft, very friable, nonsticky and nonplastic; common very fine and coarse roots; many very fine tubular and few fine interstitial pores; 10 percent gravel; neutral (pH 7.0); abrupt smooth boundary.

R—16 inches; pumiceous tuff.

The depth to lithic contact ranges from 10 to 20 inches.

The A horizon has dry color of 10YR 4/3, 5/2, or 5/3. Moist color is 10YR 3/2 or 3/3. The content of organic matter is 1 to 2 percent. The texture is gravelly sandy loam or sandy loam. The content of clay ranges from 10 to 18 percent. The content of rock fragments, mostly gravel, ranges from 15 to 25 percent. Base saturation ranges from 80 to 100 percent.

Swanberger Series

The Swanberger series consists of very deep, very poorly drained soils that formed in alluvium derived from mixed volcanic rock. These soils are in basins. Slopes are 0 to 1 percent. The mean annual precipitation is 16 to 35 inches, and the mean annual temperature is 45 to 48 degrees F.

Taxonomic classification: Fine, smectitic, mesic Cumulic Vertic Epiaquolls

Typical Pedon

Swanberger muck, 0 to 1 percent slopes, about 10.5 miles northwest of Lookout; 2,950 feet west and 900 feet north of the southeast corner of sec. 4, T. 40 N., R. 6 E., Whitehorse SE (Egglake) quadrangle (7.5 minute series):

Oa—0 to 5 inches; very dark gray (10YR 3/1) muck (sapric material), black (10YR 2/1) moist; common fine distinct strong brown (7.5YR 5/6) iron accumulations; weak very fine subangular blocky structure; soft, friable, nonsticky and nonplastic; common fine and many very fine roots; common very fine interstitial pores; neutral (pH 7.0); abrupt smooth boundary.

Bg—5 to 15 inches; dark gray (N 4/0) clay, dark greenish gray (5BG 4/1) moist; strong coarse prismatic structure; extremely hard, extremely firm, very sticky and very plastic; common very fine and fine roots; common very fine tubular pores; moderately alkaline (pH 8.0); gradual smooth boundary.

Bgk1—15 to 34 inches; gray (10YR 5/1) clay, dark greenish gray (5BG 4/1) moist; moderate fine prismatic structure; extremely hard, extremely firm, very sticky and very plastic; few very fine roots; few very fine tubular pores; strongly effervescent; lime segregated in common fine and medium soft masses; moderately alkaline (pH 8.0); abrupt smooth boundary.

Bgk2—34 to 41 inches; gray (10YR 5/1) clay, dark greenish gray (5G 4/1) moist; common fine distinct dark brown (10YR 3/3) iron accumulations; moderate fine angular blocky structure; extremely hard, firm, sticky and plastic; few very fine tubular pores; strongly effervescent; lime segregated in common fine and medium soft masses; moderately alkaline (pH 8.0); abrupt smooth boundary.

Bk1—41 to 45 inches; pale brown (10YR 6/3) silty clay, dark brown (10YR 3/3) moist; common fine distinct dark gray (5Y 4/1) iron accumulations; moderate fine angular blocky structure; extremely hard, firm, sticky and plastic; few very fine tubular pores; strongly effervescent; lime segregated in common medium soft masses; strongly alkaline (pH 8.5); clear smooth boundary.

Bk2—45 to 57 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; many fine distinct gray (N 5/0) iron depletions; weak fine prismatic structure parting to weak fine angular blocky; very hard, very firm, sticky and plastic; few very fine tubular pores; strongly effervescent with disseminated lime; strongly alkaline (pH 8.5); abrupt smooth boundary.

Bk3—57 to 75 inches; very pale brown (10YR 7/3)

clay loam, brown (10YR 4/3) moist; many fine distinct gray (N 5/0) iron depletions; moderate fine prismatic structure parting to moderate fine angular blocky; hard, very firm, sticky and plastic; few very fine tubular pores; strongly effervescent with disseminated lime; strongly alkaline (pH 8.5).

The thickness of the mollic epipedon ranges from 26 to 44 inches. The particle-size control section ranges from 40 to 60 percent clay. Surface cracks 1/4 to 1/2 inch wide extend to a depth of 12 to 17 inches. Some pedons have a weakly cemented duripan below a depth of 60 inches.

The Oa horizon has dry color of 10YR 3/1, 4/1, 5/1, or 4/2 or N 3/0. Moist color is 10YR 2/1, 3/1, 4/1, or 3/2 or N 3/0. The content of organic matter ranges from 20 to 27 percent. The texture is muck or clay. The content of clay ranges from 40 to 60 percent. Reaction is neutral or slightly alkaline.

The Bg horizon has dry color of N 4/0 or 10YR 4/1, 5/1, or 4/2. Moist color is 5BG 4/1, N 2/0 or 3/0, or 10YR 2/1, 4/1, or 3/2. The content of organic matter is 2 to 3 percent. The texture is clay or silty clay. The content of clay ranges from 40 to 60 percent. Reaction is slightly alkaline or moderately alkaline.

The Bgk horizon has dry color of 10YR 4/1, 5/1, or 4/2 or 5Y 5/1. Moist color is 5BG 4/1, 10YR 2/1 or 4/1, 5G 4/1, N 3/0 or 4/0, or 5Y 4/1. The content of organic matter is 2 to 3 percent. The texture is clay or silty clay. The content of clay ranges from 40 to 60 percent.

The Bk horizon has dry color of 10YR 4/1, 6/2, 7/2, 6/3, or 7/3; 2.5Y 4/2; or 5Y 4/1. Moist color is 10YR 4/2, 3/3, or 4/3; 5Y 3/1 or 4/1; or 2.5Y 3/2 or 6/2. The content of organic matter is 0.5 to 1.0 percent. The texture is silty clay or clay loam. The content of clay ranges from 35 to 50 percent. Reaction is moderately alkaline or strongly alkaline.

Sweagert Series

The Sweagert series consists of moderately deep, moderately well drained soils that formed in alluvium derived from extrusive igneous rock. These soils are on terraces. Slopes range from 0 to 9 percent. The mean annual precipitation is 14 to 16 inches, and the mean annual temperature is 45 to 50 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Typic Durixerolls

Typical Pedon

Sweagert gravelly sandy loam, in an area of Oxendine-Sweagert complex, 0 to 5 percent slopes, about 4 miles north of Adin, 300 feet south of dirt road, 40 feet east of BLM boundary fence; 1,300 feet west and 1,800 feet north of the southeast corner of sec. 4, T. 39 N., R. 9 E., Adin NW (Adin) quadrangle (7.5 minute series):

A1—0 to 3 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate very thin platy structure; slightly hard, very friable, nonsticky and slightly plastic; many very fine roots; common very fine tubular pores; 30 percent very fine gravel; slightly acid (pH 6.5); abrupt smooth boundary.

A2—3 to 6 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate very thin platy structure; slightly hard, very friable, nonsticky and slightly plastic; common very fine and fine roots; common very fine tubular pores; 5 percent very fine gravel; slightly acid (pH 6.5); abrupt smooth boundary.

Bt1—6 to 12 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; few thin clay films in pores; 5 percent gravel; neutral (pH 6.8); clear smooth boundary.

Bt2—12 to 16 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine and few fine tubular pores; common thin clay films on peds and in pores; 5 percent gravel; neutral (pH 7.0); clear smooth boundary.

Bt3—16 to 24 inches; pale brown (10YR 6/3) clay loam, dark brown (10YR 3/3) moist; moderate medium angular blocky structure; hard, firm, slightly sticky and plastic; few very fine roots; common very fine and few fine tubular pores; many moderately thick clay films on peds and in pores; 5 percent gravel; neutral (pH 7.0); abrupt wavy boundary.

2Bt4—24 to 26 inches; light yellowish brown (10YR 6/4) gravelly clay, yellowish brown (10YR 5/4) moist; strong medium angular blocky structure; hard, firm, slightly sticky and very plastic; common very fine matted roots; few very fine tubular pores; many thick clay films on faces of peds and in pores; 30 percent fine gravel; neutral (pH 7.0); abrupt smooth boundary.

2Bqm—26 to 33 inches; very pale brown (10YR 7/4), continuously strongly cemented duripan, dark yellowish brown (10YR 4/4) moist; strong thin platy structure; indurated, continuous silica and

manganese cap 1/4 to 1/8 inch thick; 30 percent gravel and 20 percent cobbles; slightly alkaline (pH 7.5); clear wavy boundary.

2Bqkm—33 to 60 inches; very pale brown (10YR 7/4), strongly cemented duripan, dark yellowish brown (10YR 4/4) moist; strong thin platy structure; 60 percent gravel and 10 percent cobbles; slightly effervescent; moderately alkaline (pH 8.0).

Depth to the duripan ranges from 20 to 40 inches. The thickness of the mollic epipedon ranges from 14 to 20 inches. The particle-size control section (6 to 26 inches) averages 27 to 35 percent clay and 5 to 30 percent rock fragments, mostly gravel. Base saturation by sum of cations ranges from 90 to 100 percent.

The A horizon has dry color of 10YR 5/1, 5/2, or 5/3. Moist color is 10YR 3/2 or 3/3. The content of organic matter ranges from 1 to 4 percent. The texture is gravelly sandy loam or loam. The content of clay ranges from 12 to 25 percent. The content of rock fragments, mostly gravel, ranges from 5 to 30 percent. Reaction is slightly acid or neutral.

The Bt1 and Bt2 horizons have dry color of 10YR 4/1, 4/2, 4/3, 4/4, 5/1, 5/2, or 5/3 or 7.5YR 5/2. Moist color is 10YR 2/1, 2/2, 3/1, 3/2, 3/3, or 4/2 or 7.5YR 3/2. The content of organic matter is 1 to 2 percent. The texture is loam or clay loam. The content of clay ranges from 25 to 30 percent. The content of rock fragments, mostly gravel, ranges from 0 to 15 percent. Reaction is slightly acid or neutral.

The Bt3 horizon has dry color of 10YR 6/1, 6/3, or 7/4 or 7.5YR 5/4. Moist color is 10YR 3/3, 3/4, 4/2, or 4/4 or 7.5YR 3/2, 4/2, or 4/4. The content of organic matter ranges from 0.5 to 2.0 percent. The texture is clay loam or sandy clay loam. The content of clay ranges from 30 to 35 percent. The content of rock fragments, mostly gravel, ranges from 5 to 15 percent. Reaction is slightly acid or neutral.

The 2Bt4 horizon has dry color of 10YR 5/4 or 6/4. Moist color is 10YR 3/4 or 5/4. The content of organic matter is 0.3 to 0.8 percent. The texture is gravelly clay, clay, or gravelly clay loam. The content of clay ranges from 30 to 45 percent. The content of rock fragments, mostly gravel, ranges from 10 to 30 percent.

The content of rock fragments, mostly gravel or cobbles, ranges from 35 to 60 percent in the upper part of the 2Bqkm horizon and from 60 to 80 percent in the lower part. Reaction is slightly alkaline or moderately alkaline in this horizon.

The Sweagert soil in map unit 295 is a taxadjunct because it is slightly cooler than is defined as the range for the series. This soil is classified as fine-loamy, mixed, superactive, frigid Typic Durixerolls.

Tionesta Series

The Tionesta series consists of very deep, well drained soils that formed in tephra. These soils are on hills. Slopes range from 2 to 30 percent. The mean annual precipitation is 25 to 35 inches, and the mean annual temperature is 39 to 44 degrees F.

Taxonomic classification: Pumiceous or ashy-pumiceous over medial-skeletal, mixed, frigid Typic Haploxerands

Typical Pedon

Tionesta very gravelly loamy coarse sand, 2 to 15 percent slopes, about 8.2 miles southwest of Tionesta, on the road from Old Camp to Black Mountain; 2,680 feet south and 2,300 feet east of the northwest corner of sec. 18, T. 43 N., R. 5 E., Timber Mountain SW (West of Kephart) quadrangle (7.5 minute series):

Oi—3 inches to 0; recent and decomposed litter.

A—0 to 5 inches; gray (10YR 5/1) very gravelly loamy coarse sand, black (7.5YR 2/0) moist; single grain; loose, nonsticky and nonplastic; common very fine and few fine roots; many very fine interstitial pores; 45 percent pumice gravel; slightly acid (pH 6.2); abrupt smooth boundary.

C—5 to 15 inches; 60 percent white (10YR 8/2) and 40 percent strong brown (7.5YR 4/6) extremely gravelly coarse sand, 60 percent white (10YR 8/2) and 40 percent brown (7.5YR 4/4) moist; single grain; loose, nonsticky and nonplastic; common very fine and few fine, medium, and coarse roots; many very fine interstitial pores; 80 percent pumice gravel; neutral (pH 6.7); abrupt smooth boundary.

2Bw1—15 to 31 inches; light brown (7.5YR 6/4) gravelly coarse sandy loam, brown (7.5YR 4/4) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and medium and few very fine and coarse roots; many very fine interstitial pores; 30 percent andesite gravel; neutral (pH 6.7); clear wavy boundary.

2Bw2—31 to 53 inches; pink (7.5YR 7/4) extremely gravelly coarse sandy loam, brown (7.5YR 5/4) moist; single grain; loose, nonsticky and nonplastic; common fine and medium and few coarse roots; many very fine interstitial pores; 55 percent andesite gravel and 10 percent cobbles; neutral (pH 6.7); clear wavy boundary.

3Bw3—53 to 70 inches; reddish yellow (7.5YR 7/6) extremely gravelly loamy coarse sand, brown (7.5YR 5/4) moist; single grain; loose, nonsticky and nonplastic; few fine and medium roots; many very fine interstitial pores; 40 percent andesite gravel and 30 percent basalt cobbles; neutral (pH 6.7).

The depth to bedrock is more than 80 inches. The particle-size control section (0 to 40 inches) ranges from 2 to 18 percent clay and from 15 to 90 percent rock fragments.

The A horizon has dry color of 10YR 4/1, 5/1, 5/2, 6/1, or 6/2. Moist color is 10YR 2/1, 2/2, 3/1, 3/2, or 4/2 or N 2/0. The content of organic matter ranges from 6 to 9 percent. The content of rock fragments, mostly rhyolitic pumice gravel, ranges from 35 to 60 percent. NaF pH ranges from 8.0 to 8.8. Reaction is slightly acid or moderately acid.

The C horizon has dry color of 10YR 7/2, 8/1, or 8/2 or 7.5YR 4/6. Moist color is 10YR 8/2, 8/3, or 8/4 or 7/5YR 4/4. The content of organic matter ranges from 2 to 4 percent. The content of rock fragments, mostly rhyolitic pumice gravel, ranges from 60 to 90 percent. NaF pH ranges from 8.0 to 8.8. Reaction is slightly acid or neutral.

The 2Bw1 horizon has dry color of 7.5YR 4/4, 5/4, or 6/4. Moist color is 7.5YR 3/4 or 4/4. The content of organic matter is 1 to 2 percent. The content of gravel ranges from 15 to 30 percent, and the content of cobbles ranges from 0 to 10 percent. NaF pH ranges from 10.0 to 11.5. Reaction is slightly acid or neutral.

The 2Bw2 and 3Bw3 horizons have dry color of 7.5YR 6/4, 7/4, or 7/6. Moist color is 7.5YR 4/4 or 5/4. The content of organic matter is 0.5 to 1.0 percent. The texture is extremely gravelly coarse sandy loam or extremely gravelly loamy coarse sand. The content of gravel ranges from 50 to 60 percent, the content of cobbles ranges from 10 to 30 percent, and the content of stones ranges from 0 to 10 percent. NaF pH ranges from 10.0 to 10.5. Reaction is slightly acid or neutral.

Trojan Series

The Trojan series consists of deep, well drained soils that formed in slope alluvium weathered from extrusive igneous rock. These soils are on hills. Slopes range from 15 to 30 percent. The mean annual precipitation is 20 to 25 inches, and the mean annual temperature is 39 to 44 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, frigid Ultic Argixerolls

Typical Pedon

Trojan loam, in an area of Trojan-Erig complex, 15 to 30 percent slopes, about 16 miles northeast of Adin, 1.5 miles east and 1.5 miles north on a dirt road from the intersection near Hazelton Reservoir; 4,360 feet north and 400 feet west of the southeast corner of sec. 17, T. 36 N., R. 10 E., Hayden Hill NW (Silva Flat Reservoir) quadrangle (7.5 minute series):

Oi—2 inches to 0; undecomposed and partially decomposed pine needles.

A—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark brown (10YR 2/2) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine and many very fine roots; common very fine interstitial and many very fine tubular pores; 5 percent gravel; slightly acid (pH 6.2); abrupt wavy boundary.

BA—4 to 14 inches; grayish brown (10YR 5/2) cobbly loam, very dark brown (10YR 2/2) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, sticky and plastic; common fine, medium, and coarse and many very fine roots; few fine and many very fine tubular pores; 5 percent gravel and 25 percent cobbles; slightly acid (pH 6.1); clear smooth boundary.

Bt1—14 to 22 inches; brown (10YR 5/3) gravelly clay loam, dark brown (7.5YR 3/4) moist; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; common very fine, fine, medium, and coarse roots; common fine and many very fine tubular pores; few moderately thick clay films on faces of peds and in pores and many thin clay films on faces of peds; 15 percent gravel; slightly acid (pH 6.1); clear smooth boundary.

Bt2—22 to 31 inches; brown (10YR 5/3) gravelly clay loam, dark brown (7.5YR 3/4) moist; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; few very fine and common fine and medium roots; common fine and many very fine tubular pores; common thin clay films on faces of peds and moderately thick clay films on faces of peds and in pores; 20 percent gravel; slightly acid (pH 6.1); clear smooth boundary.

Bt3—31 to 48 inches; brown (10YR 5/3) extremely gravelly clay loam, dark brown (7.5YR 4/4) moist; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; few very fine and common fine and medium roots; common fine and many very fine tubular pores; few moderately thick clay films on faces of peds

and in pores and many thin clay films on faces of peds; 50 percent gravel and 10 percent cobbles; slightly acid (pH 6.1); abrupt smooth boundary.

R—48 inches; fractured tuff; fractures are filled with soil material.

The depth to bedrock of tuff or basalt ranges from 40 to 60 inches. The content of organic matter ranges from 1 to 4 percent to a depth of 11 to 18 inches. Base saturation by sum of cations ranges from 65 to 75 percent.

The A and BA horizons have dry color of 10YR 4/3, 5/2, or 5/3. Moist color is 10YR 2/2 or 3/2. The content of rock fragments ranges from 5 to 30 percent. The content of gravel ranges from 5 to 10 percent, and the content of cobbles ranges from 0 to 25 percent. The content of clay ranges from 18 to 25 percent.

The Bt horizon has dry color of 10YR 5/3, 4/4, 5/4, or 6/4. Moist color is 10YR 3/2 or 3/4 or 7.5YR 3/4 or 4/4. The texture is clay loam or sandy clay loam. The content of clay ranges from 30 to 35 percent. The content of rock fragments ranges from 15 to 35 percent in the upper part and from 35 to 60 percent in the lower part.

Twinbuttes Series

The Twinbuttes series consists of very deep, somewhat excessively drained soils that formed in tephra. These soils are on cindercones and in pockets between lava flows. Slopes range from 2 to 50 percent. The mean annual precipitation is 35 to 45 inches, and the mean annual temperature is 39 to 41 degrees F.

Taxonomic classification: Medial-skeletal, frigid Typic Vitrixerands

Typical Pedon

Twinbuttes very gravelly coarse sandy loam, 30 to 50 percent slopes, about 7.7 miles southeast of Burney on Twinbuttes; 2,100 feet south and 1,800 feet west of the northeast corner of sec. 26, T. 34 N., R. 3 E., Burney SE (Burney Mountain East) quadrangle (7.5 minute series):

Oi—1 inch to 0; recent and decomposed litter.

A1—0 to 3 inches; yellowish brown (10YR 5/4) very gravelly coarse sandy loam, dark brown (10YR 3/3) moist; single grain; loose, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; 50 percent cinder gravel; slightly acid (pH 6.5); abrupt smooth boundary.

A2—3 to 7 inches; brown (7.5YR 5/4) extremely gravelly coarse sandy loam, dark brown (7.5YR 3/4) moist; single grain; loose, nonsticky and nonplastic; many very fine, common fine, and few medium roots; many very fine interstitial pores; 70 percent cinder gravel; neutral (pH 7.0); abrupt smooth boundary.

Bw1—7 to 14 inches; strong brown (7.5YR 5/6) extremely gravelly coarse sandy loam, strong brown (7.5YR 4/6) moist; single grain; loose, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; many very fine interstitial pores; 80 percent cinder gravel; neutral (pH 7.0); abrupt wavy boundary.

Bw2—14 to 22 inches; reddish yellow (7.5YR 6/6) extremely gravelly coarse sandy loam, strong brown (7.5YR 4/6) moist; single grain; loose, nonsticky and nonplastic; few very fine and common fine and medium roots; many very fine interstitial pores; 80 percent cinder gravel; neutral (pH 7.0); clear smooth boundary.

Bw3—22 to 34 inches; reddish yellow (7.5YR 6/6) extremely gravelly coarse sandy loam, strong brown (7.5YR 4/6) moist; single grain; loose, nonsticky and nonplastic; few very fine, common fine and medium, and few coarse roots; many very fine interstitial pores; 80 percent cinder gravel; neutral (pH 7.0); clear smooth boundary.

C1—34 to 45 inches; brownish yellow (10YR 6/6) extremely gravelly loamy coarse sand, dark yellowish brown (10YR 3/6) moist; single grain; loose, nonsticky and nonplastic; few very fine and common fine and medium roots; many very fine interstitial pores; silica pendants on undersides of cinders; 85 percent cinder gravel; neutral (pH 7.0); abrupt wavy boundary.

C2—45 to 49 inches; brownish yellow (10YR 6/6) extremely gravelly coarse sandy loam, dark yellowish brown (10YR 3/4) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; silica pendants on undersides of cinders; 85 percent cinder gravel; neutral (pH 7.0); abrupt wavy boundary.

C3—49 to 72 inches; very dark gray (10YR 3/1) extremely gravelly coarse sand, black (N 2/0) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 80 percent cinder gravel; neutral (pH 7.0).

The depth to bedrock is more than 60 inches. The particle-size control section (0 to 40 inches) ranges from 50 to 85 percent rock fragments, mostly cinders. NaF pH is 11.0 to 9.5. Base saturation by ammonium acetate ranges from 60 to 80 percent.

The A horizon has dry color of 10YR 4/2 or 5/4 or 7.5YR 5/4. Moist color is 10YR 3/2 or 3/3 or 7.5YR 3/4. The content of organic matter ranges from 4 to 6 percent. Reaction is slightly acid or neutral.

The Bw horizon has dry color of 7.5YR 6/4, 5/6, 6/6, or 7/6. Moist color is 7.5YR 4/4 or 4/6. The content of organic matter ranges from 0.2 to 2.0 percent.

The C horizon has dry color of 10YR 3/1 or 6/6 or 7.5YR 7/6 and is lithochromic. Moist color is 10YR 3/4 or 3/6 or N 2/0. The content of organic matter is 0.1 to 0.3 percent. The texture is coarse sandy loam, loamy coarse sand, or coarse sand. The content of rock fragments, mostly cinders, ranges from 80 to 90 percent.

Typic Vitrixerands

Typic Vitrixerands are moderately deep to very deep, somewhat excessively drained soils that formed in tephra. These soils are on mountains. Slopes range from 30 to 50 percent. The mean annual precipitation is 35 to 60 inches, and the mean annual temperature is 39 to 41 degrees F.

Taxonomic classification: Typic Vitrixerands

Representative Pedon

Typic Vitrixerands, in an area of Rubble land-Typic Vitrixerands complex, 30 to 50 percent slopes, about 5.2 miles southeast of Burney; 1,900 feet west and 2,650 feet north of the southeast corner of sec. 16, T. 34 N., R. 3 E., Burney SW (Burney Mountain West) quadrangle (7.5 minute series):

Oi—2 inches to 0; fresh and decomposed litter.

A—0 to 3 inches; very dark gray (10YR 3/1) very gravelly sandy loam, black (10YR 2/1) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and common fine and medium roots; many very fine interstitial pores; 35 percent gravel; moderately acid (pH 6.0); abrupt smooth boundary.

Bw1—3 to 6 inches; very pale brown (10YR 7/3) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; many very fine interstitial pores; 40 percent gravel; moderately acid (pH 6.0); clear smooth boundary.

Bw2—6 to 13 inches; pale brown (10YR 6/3) extremely gravelly loamy sand, dark brown (7.5YR 3/2) moist; single grain; loose, nonsticky and nonplastic; common very fine and medium roots; many very fine interstitial pores; 65 percent gravel; neutral (pH 6.8); clear smooth boundary.

Bw3—13 to 25 inches; yellowish brown (10YR 5/4) very gravelly sandy loam, dark brown (10YR 3/3) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 45 percent gravel; neutral (pH 7.0); clear smooth boundary.

Bw4—25 to 33 inches; yellowish brown (10YR 5/4) extremely gravelly loamy sand, dark yellowish brown (10YR 3/4) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 70 percent gravel; neutral (pH 7.0); clear smooth boundary.

C1—33 to 44 inches; brown (10YR 5/3) extremely gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure; weakly cemented, firm, nonsticky and nonplastic; few very fine roots; common very fine interstitial pores; 70 percent gravel; neutral (pH 7.0); abrupt smooth boundary.

C2—44 to 46 inches; brown (10YR 5/3) extremely gravelly loamy sand, dark brown (10YR 3/3) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 70 percent gravel; neutral (pH 7.0); abrupt smooth boundary.

C3—46 to 67 inches; yellowish brown (10YR 5/4), weakly cemented extremely gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; common very fine interstitial pores; 80 percent gravel; neutral (pH 7.0).

The depth to lithic contact ranges from 20 to 90 inches. The particle-size control section (0 to 40 inches) ranges from 5 to 15 percent clay and from 10 to 80 percent rock fragments and is medial or medial-skeletal.

The A horizon has dry color of 10YR 3/1, 3/2, or 3/3. Moist color is 10YR 2/1 or 3/1. The content of organic matter is 1 to 2 percent. The content of clay ranges from 12 to 15 percent. The content of rock fragments, mostly gravel, ranges from 10 to 60 percent. NaF pH ranges from 10.0 to 11.0. Reaction is moderately acid or slightly acid.

The Bw horizon has dry color of 10YR 5/4, 6/3, or 7/3. Moist color is 10YR 3/2, 3/3, or 3/4 or 7.5YR 3/2. The content of organic matter is 1 to 2 percent. The texture is very gravelly sandy loam or extremely gravelly loamy sand. The content of clay ranges from 5 to 15 percent. The content of rock fragments, mostly gravel, ranges from 10 to 80 percent. NaF pH ranges from 9.8 to 10.5. Reaction ranges from moderately acid to neutral.

The C horizon has dry color of 10YR 5/3 or 5/4. Moist color is 10YR 3/2 or 3/3. The content of organic matter is 0.5 to 1.0 percent. The texture is extremely gravelly loamy sand or extremely gravelly sandy loam. The content of clay ranges from 5 to 15 percent. The content of rock fragments, mostly gravel, ranges from 60 to 80 percent. NaF pH ranges from 9.5 to 9.8. Reaction is slightly acid or neutral. Some pedons do not have a C horizon, do not have a weakly cemented C horizon, or have lithic contact below a depth of 20 inches.

Vansickle Series

The Vansickle series consists of shallow, moderately well drained soils that formed in alluvium derived from extrusive igneous rock. These soils are on lava plateaus. Slopes range from 2 to 15 percent. The mean annual precipitation is 12 to 18 inches, and the mean annual temperature is 45 to 50 degrees F.

Taxonomic classification: Clayey-skeletal, smectitic, mesic, shallow Abruptic Argiduridic Durixerolls

Typical Pedon

Vansickle very cobbly loam, in an area of Longcreek-Vansickle-Rock outcrop complex, 9 to 30 percent slopes, about 1.5 miles northeast of Little Valley, 0.75 mile north of the railroad crossing on the road to Clark Valley, 400 feet north of the road on a bench above Sunflower Flat; 1,800 feet east and 2,200 feet north of the southwest corner of sec. 33, T. 36 N., R. 7 E., Little Valley NW (Little Valley) quadrangle (7.5 minute series):

A—0 to 1 inch; dark grayish brown (10YR 4/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; very hard, friable, slightly sticky and plastic; many very fine roots; many very fine and few fine interstitial pores; 10 percent gravel, 30 percent cobbles, 10 percent stones; slightly acid (pH 6.2); clear smooth boundary.

Bt1—1 to 6 inches; brown (7.5YR 4/2) very cobbly clay loam, dark brown (7.5YR 3/2) moist; moderate fine and medium subangular blocky structure; very hard, friable, sticky and plastic; many thin clay films in bridges between mineral grains and few clay films on peds; 40 percent cobbles; slightly acid (pH 6.3); clear smooth boundary.

Bt2—6 to 11 inches; dark reddish gray (5YR 4/2) very cobbly clay, dark reddish brown (5YR 3/3) moist; moderate medium and coarse subangular blocky structure; extremely hard, friable, sticky and plastic; many very fine interstitial pores; many thin clay films in bridges between mineral grains and on peds; 45 percent cobbles; slightly acid (pH 6.2); abrupt wavy boundary.

Bt3—11 to 13 inches; dark reddish gray (5YR 4/2) very cobbly clay, reddish brown (5YR 4/3) moist; moderate medium prismatic structure; extremely hard, friable, sticky and plastic; few very fine roots; common moderately thick clay films on peds; 40 percent cobbles; slightly acid (pH 6.2); abrupt wavy boundary.

Bqm—13 to 14 inches; weathered duripan with opalized silica cap covering more than 50 percent of the underlying bedrock.

2R—14 inches; basalt.

Depth to the duripan ranges from 10 to 20 inches. The depth to bedrock ranges from 11 to 30 inches. The mollic epipedon is 10 to 20 inches thick and includes all or part of the Bt horizon. Reaction is slightly acid or neutral.

The A horizon has dry color of 10YR 4/2 or 5/3. The texture is very cobbly loam or extremely stony loam. The content of rock fragments, mostly cobbles and stones, ranges from 35 to 60 percent.

The Bt horizon has dry color of 5YR 4/2 or 7.5YR 4/2, 4/4, or 5/4. Moist color is 7.5YR 3/2 or 5YR 3/3, 3/4, or 4/3. The content of rock fragments, mostly cobbles and gravel, ranges from 35 to 60 percent. The content of clay ranges from 35 to 40 percent in the upper part and from 40 to 60 percent in the lower part.

Wengler Series

The Wengler series consists of very deep, somewhat excessively drained soils that formed in tephra deposited over basaltic lava flows. These soils are on lava plateaus, hills, and escarpments. Slopes range from 5 to 50 percent. The mean annual precipitation is 35 to 45 inches, and the mean annual temperature is 39 to 41 degrees F.

Taxonomic classification: Medial-skeletal, mixed, frigid Typic Haploxerands

Typical Pedon

Wengler very gravelly coarse sandy loam, 5 to 15 percent slopes, about 10.5 miles southeast of Burney, on the north side of Freener Peak; 800 feet north and 1,550 feet east of the southwest corner of sec. 33, T. 34 N., R. 4 E., Burney SE (Burney Mountain East) quadrangle (7.5 minute series):

A—0 to 4 inches; brown (10YR 5/3) very gravelly coarse sandy loam, dark brown (7.5YR 3/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and

nonplastic; many very fine and common fine and medium roots; many very fine interstitial pores; 40 percent vesicular basalt gravel; slightly acid (pH 6.5); abrupt smooth boundary.

Bw1—4 to 12 inches; brown (7.5YR 5/4) very gravelly coarse sandy loam, brown or dark brown (7.5YR 4/4) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, common fine, and few medium and coarse roots; many very fine interstitial pores; slightly acid (pH 6.5); 45 percent vesicular basalt gravel; slightly acid (pH 6.5); clear smooth boundary.

2Bw2—12 to 17 inches; light brown (7.5YR 6/4) very gravelly coarse sandy loam, brown (7.5YR 4/4) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, common fine, and few medium and coarse roots; many very fine interstitial pores; 50 percent vesicular basalt gravel with secondary silica pendants on undersides; slightly acid (pH 6.5); clear wavy boundary.

2Bw3—17 to 25 inches; light brown (7.5YR 6/4) extremely gravelly loamy coarse sand, brown or dark brown (7.5YR 4/4) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, common fine, and few medium and coarse roots; many very fine interstitial pores; 60 percent vesicular basalt gravel with secondary silica pendants on undersides; 10 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

3C1—25 to 47 inches; yellowish brown (10YR 5/4) extremely gravelly sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, nonsticky and nonplastic; many very fine and common fine, medium, and coarse roots; many very fine interstitial pores; 60 percent vesicular basalt and some cinder gravel; 10 percent cobbles and 5 percent stones; slightly acid (pH 6.5); gradual wavy boundary.

3C2—47 to 80 inches; yellowish brown (10YR 5/4) extremely gravelly loamy coarse sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, nonsticky and nonplastic; common very fine and few fine, medium, and coarse roots; many very fine interstitial pores; 70 percent vesicular basalt and cinder gravel; 10 percent cobbles and 5 percent stones; slightly acid (pH 6.5).

The depth to bedrock is more than 60 inches. The particle-size control section (0 to 40 inches) ranges from 40 to 85 percent rock fragments. Base saturation by ammonium acetate ranges from 50 to 78 percent.

The A horizon has dry color of 10YR 5/3 or 5/4. Moist color is 10YR 3/2 or 3/3 or 7.5YR 3/2. The content of organic matter ranges from 7 to 9 percent. The content of rock fragments, mostly vesicular basalt, ranges from 35 to 55 percent. The content of gravel and cobbles ranges from 0 to 5 percent. NaF pH ranges from 10.5 to 11.5.

The Bw1 horizon has dry color of 7.5YR 5/4 or 6/4. Moist color is 7.5YR 4/4 or 4/6. The content of organic matter is 1 to 2 percent. The content of vesicular basalt gravel ranges from 35 to 55 percent, and the content of vesicular basalt cobbles ranges from 0 to 5 percent. NaF pH ranges from 10.5 to 11.0.

The 2Bw horizon has dry color of 7.5YR 6/4, 7/4, or 6/6. Moist color is 7.5YR 4/4 or 4/6. The content of organic matter is 0.2 to 0.5 percent. The content of vesicular basalt gravel ranges from 35 to 70 percent, and the content of vesicular basalt cobbles ranges from 0 to 15 percent. NaF pH ranges from 10.0 to 10.5.

The 3C horizon has dry color of 10YR 5/4 or 6/4 or 7.5YR 7/6. Moist color is 10YR 3/4 or 4/4 or 7.5YR 4/6. The content of organic matter is 0.05 to 0.20 percent. The content of clay ranges from 3 to 10 percent. The content of vesicular basalt gravel and some cindery gravel ranges from 60 to 70 percent. The content of cobbles ranges from 0 to 20 percent, and the content of stones ranges from 0 to 5 percent. NaF pH ranges from 8.8 to 10.5.

Whipp Series

The Whipp series consists of moderately deep, somewhat poorly drained soils that formed in mixed alluvium. These soils are in basins. Slopes range from 0 to 2 percent. The mean annual precipitation is 14 to 20 inches, and the mean annual temperature is 48 to 52 degrees F.

Taxonomic classification: Fine, smectitic, mesic Natric Duraquolls

Typical Pedon

Whipp silt loam, in an area of Whipp-Cupvar complex, slightly saline, 0 to 2 percent slopes, about 2 miles northwest of McArthur in McArthur Swamp; 300 feet north and 600 feet east of the southwest corner of sec. 6, T. 37 N., R. 5 E., Fall River Mills SW (Fall River) quadrangle (7.5 minute series):

E—0 to 1 inch; dark grayish brown (10YR 4/2 moist) silt loam, light gray (10YR 7/1) dry; common fine prominent very dark grayish brown (10YR 3/2 moist) iron accumulations, dark yellowish brown

(10YR 4/4) dry; moderate thin platy structure; hard, friable, nonsticky and nonplastic; many very fine roots; many very fine tubular and common fine vesicular pores; neutral (pH 7.0); abrupt smooth boundary.

Bw—1 to 3 inches; very dark grayish brown (2.5Y 3/2 moist) silty clay loam, grayish brown (2.5Y 5/2) dry; common fine prominent very dark grayish brown (10YR 3/2 moist) iron accumulations, dark yellowish brown (10YR 4/4) dry; moderate medium angular blocky structure; very hard, firm, slightly sticky and plastic; many very fine roots; many very fine and few fine and medium tubular pores; moderately alkaline (pH 8.0); abrupt smooth boundary.

Btn—3 to 11 inches; very grayish brown (2.5Y 3/2 moist) silty clay, grayish brown (2.5Y 5/2) dry; strong fine subangular blocky structure; hard, friable, sticky and plastic; many very fine and few fine and medium roots; many very fine and few fine and medium tubular pores; few thin clay films in pores; slightly effervescent; strongly alkaline (pH 8.9); clear wavy boundary.

Btnk1—11 to 16 inches; dark grayish brown (2.5Y 4/2 moist) silty clay, grayish brown (2.5Y 5/2) dry; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few very fine and fine roots; many very fine and fine tubular pores; many fine slickensides; many thin clay films on peds and few thin clay films in pores; very slightly effervescent; lime segregated in common fine irregular soft masses; very strongly alkaline (pH 9.8); clear wavy boundary.

Btnk2—16 to 22 inches; dark grayish brown (2.5Y 4/2 moist) silty clay loam, grayish brown (2.5Y 5/2) dry; common fine prominent dark brown (10YR 3/3 moist) iron accumulations, brown (10YR 5/3) dry; weak thin platy structure parting to weak fine subangular blocky; hard, friable, sticky and plastic; few very fine and fine roots; many very fine and fine tubular pores; many thin clay films on peds and common thin clay films in pores; slightly effervescent; lime segregated in common fine irregular soft masses; very strongly alkaline (pH 9.8); abrupt smooth boundary.

Bqkm—22 to 25 inches; dark grayish brown (10YR 4/2), indurated duripan with indurated silica cap 2 mm thick on the surface; thin platy structure; very hard, very firm; slightly effervescent; strongly alkaline (pH 8.5); clear wavy boundary.

Bqm—25 to 42 inches; dark yellowish brown (10YR 4/4 moist), weakly cemented fine sandy loam, light yellowish brown (10YR 6/4) dry; common fine prominent olive brown (2.5Y 4/4 moist) iron accumulations, light olive brown (2.5Y 5/6) dry; massive; slightly hard, friable, nonsticky and nonplastic; many very fine and medium tubular pores; neutral (pH 7.0); clear wavy boundary.

C—42 to 60 inches; dark yellowish brown (10YR 4/4 moist) fine sandy loam, yellowish brown (10YR 5/4) dry; common fine prominent light olive brown (2.5Y 5/6) iron accumulations, olive brown (2.5Y 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and medium tubular pores; neutral (pH 7.0).

Depth to the duripan ranges from 20 to 40 inches. The mollic epipedon is 7 to 14 inches thick and includes the upper part of the natric horizon.

The E horizon has dry color of 10YR 6/1, 6/2, or 7/1. Moist color is 10YR 3/2, 4/2, or 5/3. The content of clay ranges from 20 to 25 percent. The content of organic matter is 0.5 to 1.0 percent. Reaction ranges from neutral to moderately alkaline. The electrical conductivity is 0 to 1 millimho per centimeter, and the sodium adsorption ratio is 5 to 15.

The Bw horizon has dry color of 2.5Y 5/1 or 5/2. Moist color is 2.5Y 3/1 or 3/2. The texture is silt loam or silty clay loam. The content of clay ranges from 25 to 30 percent. The content of organic matter ranges from 2 to 4 percent. Reaction is moderately alkaline or strongly alkaline. The electrical conductivity is 0.5 to 1.0 millimho per centimeter, and the sodium adsorption ratio is 10 to 15.

The Btn horizon has dry color of 2.5Y or 5Y 5/1 or 5/2. Moist color is 2.5Y or 5Y 3/1, 3/2, or 4/2. The content of clay ranges from 40 to 60 percent. The content of organic matter is 1 to 2 percent. Reaction is strongly alkaline or very strongly alkaline. The electrical conductivity is 0.8 to 2.0 millimhos per centimeter, and the sodium adsorption ratio is 15 to 25.

The Btk horizon has dry color of 2.5Y or 5Y 5/2 or 6/1. Moist color is 2.5Y or 5Y 3/2 or 4/2. The content of clay ranges from 35 to 40 percent. Calcium carbonate equivalent ranges from 2 to 15 percent. Reaction is strongly alkaline or very strongly alkaline.

The Bqkm horizon has an indurated silica cap 1/8 to 1 inch thick with a calcium carbonate equivalent ranging from 30 to 50 percent. The underlying material of this horizon has a calcium carbonate equivalent of 0.5 to 2.0 percent. Reaction is strongly alkaline or very strongly alkaline. The electrical conductivity is 1 to 2 millimhos per centimeter, and the sodium adsorption ratio is 15 to 20.

The Bqm and C horizons range from neutral to moderately alkaline.

Whitinger Series

The Whitinger series consists of moderately deep, well drained soils that formed in colluvium derived from basalt. These soils are on mountain slopes. Slopes range from 5 to 50 percent. The mean annual precipitation is 16 to 18 inches, and the mean annual temperature is 45 to 47 degrees F.

Taxonomic classification: Loamy-skeletal, mixed, mesic Typic Argixerolls

Typical Pedon

Whitinger stony loam, in an area of Fiddler-Whitinger complex, 5 to 15 percent slopes, about 2.3 miles northeast of Lookout; 1,150 feet west and 700 feet south of the northeast corner of sec. 9, T. 39 N., R. 7 E., Bieber NW (Lookout) quadrangle (7.5 minute series):

A—0 to 4 inches; brown (7.5YR 5/4) stony loam, dark reddish brown (5YR 3/3) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine and fine roots; common very fine tubular pores; 10 percent basalt stones and 5 percent basalt gravel; neutral (pH 6.8); clear smooth boundary.

Bt1—4 to 10 inches; brown (7.5YR 5/4) stony loam, dark reddish brown (5YR 3/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and few fine tubular pores; common clay films bridging sand grains; 10 percent basalt stones and 15 percent basalt gravel; neutral (pH 7.0); clear smooth boundary.

Bt2—10 to 17 inches; brown (7.5YR 5/4) very cobbly clay loam, dark reddish brown (5YR 3/3) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine and few coarse roots; common very fine and few fine tubular pores; many clay films bridging sand grains; 10 percent basalt gravel and 25 percent basalt cobbles; neutral (pH 7.0); clear smooth boundary.

Bt3—17 to 30 inches; brown (7.5YR 5/4) very stony clay loam, dark reddish brown (5YR 3/4) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; common very fine and fine and few coarse roots; common very fine and few fine tubular pores; many clay films bridging sand grains and many clay films in pores; 25 percent basalt stones and 20 percent basalt cobbles; 15 percent basalt gravel; neutral (pH 7.0); clear wavy boundary.

R—30 inches; hard basalt.

The depth to bedrock ranges from 20 to 40 inches. The mollic epipedon is 11 to 18 inches thick and includes part of the Bt horizon. The content of rock fragments on the surface, mostly stones and cobbles, ranges from 15 to 50 percent.

The A horizon has dry color of 10YR 5/2, 4/3, or 4/2 or 7.5YR 5/4. Moist color is 10YR 3/2 or 2/2, 7.5YR 3/2, or 5YR 3/3. The content of clay ranges from 20 to 25 percent. The content of rock fragments ranges from 15 to 50 percent. Reaction ranges from slightly acid to slightly alkaline.

The Bt horizon has dry color of 7.5YR 5/4 or 10YR 5/4. Moist color is 7.5YR 4/4 or 5YR 3/3 or 3/4. The content of clay ranges from 27 to 35 percent. The content of rock fragments, mostly cobbles or stones, ranges from 35 to 60 percent. Reaction ranges from slightly acid to slightly alkaline and increases with depth.

Winnibulli Series

The Winnibulli series consists of deep, somewhat poorly drained soils that formed in alluvium derived from extrusive igneous rock. These soils are on alluvial fans and fan terraces. Slopes range from 0 to 5 percent. The mean annual precipitation is 25 to 35 inches, and the mean annual temperature is 40 to 45 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Aquultic Argixerolls

Typical Pedon

Winnibulli loam, in an area of Winnibulli-Burman complex, 0 to 5 percent slopes, about 1.5 miles southeast of Dana on McArthur Road; about 800 feet west and 400 feet south of the northeast corner of sec. 31, T. 38 N., R. 4 E., Pondosa SE (Dana) quadrangle (7.5 minute series):

Oi—2 inches to 0; recent and slightly decomposed pine and oak litter.

A1—0 to 2 inches; dark brown (10YR 4/3) loam, dark brown (7.5YR 3/2) moist; strong thin platy structure parting to weak fine granular; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; moderately acid (pH 6.0); abrupt smooth boundary.

A2—2 to 5 inches; dark brown (10YR 4/3) loam, dark reddish brown (5YR 3/3) moist; weak medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few fine roots; common very fine tubular and few medium vesicular pores; moderately acid (pH 6.0); abrupt smooth boundary.

BAt—5 to 11 inches; dark brown (7.5YR 4/4) loam, dark reddish brown (5YR 3/3) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and many medium roots; few fine and common very fine tubular pores; few thin clay films on peds and common thin clay films in pores; moderately acid (pH 6.0); clear smooth boundary.

Bt1—11 to 24 inches; reddish brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/4) moist; few fine distinct black (N 2/0) iron depletions, black (N 2/0) moist; moderate medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; many fine and medium and common coarse roots; many fine and common medium tubular pores; common thin clay films on peds and common moderately thick clay films in pores; slightly acid (pH 6.5); clear smooth boundary.

Bt2—24 to 38 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; few fine distinct red (2.5YR 5/6) iron accumulations, dark red (2.5YR 3/6) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; many medium and common coarse roots; many very fine and common medium tubular pores; common thin clay films on peds and common moderately thick clay films in pores; slightly acid (pH 6.5); gradual wavy boundary.

Bt3—38 to 45 inches; light yellowish brown (10YR 6/4) clay loam, dark yellowish brown (10YR 4/4) moist; few fine distinct black (N 2/0) and strong brown (7.5YR 5/6) iron accumulations, black (N 2/0) and dark brown (7.5YR 4/4) moist; strong medium subangular blocky structure; hard, firm, slightly sticky and plastic; few fine and medium roots; many very fine and common fine tubular pores; few moderately thick and many thin clay films on peds and moderately thick clay films in pores; slightly acid (pH 6.5); clear smooth boundary.

Bt4—45 to 55 inches; light gray (10YR 7/2) clay loam, brown (10YR 5/3) moist; few fine distinct black (N 2/0) and many medium distinct strong brown (7.5YR 5/6) iron accumulations, few fine black (N 2/0) and many medium dark brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; very hard, very firm, sticky and plastic; few fine and coarse and many medium roots; common very fine tubular pores; common thin clay films on peds and few moderately thick clay films in pores; slightly acid (pH 6.5); abrupt smooth boundary.

Btg1—55 to 63 inches; light gray (10YR 7/2) sandy clay loam, brown (10YR 5/3) moist; few fine distinct black (N 2/0) and many medium distinct strong brown (7.5YR 5/6) iron accumulations, few fine black (N 2/0) and many medium dark brown (7.5YR 4/4) moist; moderate coarse angular blocky structure; extremely hard, firm, slightly sticky and slightly plastic; weakly cemented; common very fine tubular pores; common thick clay films on peds and common thin clay films in pores; discontinuous manganese and silica laminar cap $^{1}/_{8}$ to $^{1}/_{4}$ inch thick; slightly acid (pH 6.5); gradual smooth boundary.

Btg2—63 to 72 inches; pink (7.5YR 7/4) sandy clay loam, dark brown (7.5YR 4/2) moist; many medium prominent black (N 2/0) iron depletions, black (N 2/0) moist; weak fine subangular blocky structure; very hard, firm, slightly sticky and slightly plastic; common very fine tubular pores; common thin clay films on peds and in pores and common thick clay films in bridges between mineral grains; slightly acid (pH 6.5); abrupt smooth boundary.

Bq—72 to 87 inches; very dark gray (5YR 3/1) sandy loam, reddish black (5YR 2.5/1) moist; massive; hard, firm, nonsticky and nonplastic; weakly cemented; discontinuous manganese and silica laminar cap $^{1}/_{16}$ to $^{1}/_{8}$ inch thick; neutral (pH 6.8).

The depth to a weakly cemented horizon ranges from 40 to more than 60 inches. Distinct redoximorphic features are at a depth of 12 to 60 inches. Some pedons are underlain by extremely gravelly sandy loam. The content of organic carbon ranges from 0.6 to 5.0 percent to a depth of 10 to 15 inches. Base saturation by ammonium acetate ranges from 55 to 68 percent to a depth of 33 inches and is more than 75 percent below that depth.

The A horizon has dry color of 10YR 4/2, 4/3, or 5/3 or 7.5YR 5/4. Moist color is 10YR 2/2, 7.5YR 3/2, or 5YR 3/3. The content of gravel ranges from 0 to 5 percent. Reaction ranges from moderately acid to neutral.

The Bt horizon has dry color of 10YR 4/3, 6/4, or 7/2; 7.5YR 4/4, 5/4, 6/4, or 7/2; or 5YR 4/4 or 5/4. Moist color is 10YR 4/4 or 5/3; 7.5YR 3/2, 3/4, 4/2, 4/4, or 5/4; or 5YR 3/2, 3/3, 3/4, or 4/4. The texture is clay loam or sandy clay loam. The content of clay ranges from 27 to 35 percent. The content of gravel ranges from 0 to 25 percent. Reaction is slightly acid or neutral.

Witcher Series

The Witcher series consists of deep, well drained soils that formed in tephra. These soils are on mountains. Slopes range from 2 to 50 percent. The mean annual precipitation is 18 to 20 inches, and the mean annual temperature is 40 to 45 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, frigid Andic Haploxeralfs

Typical Pedon

Witcher sandy loam, in an area of Witcher-Gosch complex, 15 to 30 percent slopes, about 8 miles southeast of Canby on Hermit Butte; 800 feet east and 150 feet south of the northwest corner of sec. 2, T. 40 N., R. 10 E., Canby SE (Hermit Butte) quadrangle (7.5 minute series):

Oi—2 inches to 0; recent and decomposed pine litter.

A1—0 to 2 inches; brown (10YR 5/3) sandy loam, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine roots; common very fine interstitial pores; 10 percent gravel; slightly acid (pH 6.5); abrupt smooth boundary.

A2—2 to 4 inches; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 3/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine roots; common very fine interstitial pores; 10 percent gravel; slightly acid (pH 6.5); abrupt smooth boundary.

Bt1—4 to 10 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 3/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and few medium roots; common very fine tubular pores; few thin clay films in pores; 10 percent gravel; slightly acid (pH 6.5); clear smooth boundary.

2Bt2—10 to 17 inches; brown (7.5YR 5/4) sandy clay loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and few medium and coarse roots; common very fine and few fine tubular pores; few thin clay films in pores; 10 percent gravel; slightly acid (pH 6.5); clear smooth boundary.

2Bt3—17 to 24 inches; brown (7.5YR 5/4) sandy clay loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common fine and few medium and coarse roots; common very fine and few fine tubular pores; common thin clay films in pores; 10 percent gravel; slightly acid (pH 6.5); clear smooth boundary.

2Bt4—24 to 36 inches; brown (10YR 5/3) sandy clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and plastic; common fine and few medium roots; common very fine and few fine tubular pores; common thin clay films in pores; 10 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

3BCt—36 to 47 inches; brown (10YR 5/3) very gravelly clay loam, brown (10YR 4/3) moist; moderate fine subangular blocky structure; hard, firm, slightly sticky and plastic; few fine roots; common very fine tubular pores; common thin clay films in pores; 50 percent weathered gravel; slightly acid (pH 6.5); gradual wavy boundary.

3Cr—47 inches; soft, weathered andesite.

The depth to paralithic contact ranges from 40 to 60 inches. The particle-size control section averages 27 to 35 percent clay, 50 to 60 percent sand, and 0 to 5 percent rock fragments, mostly gravel. NaF pH ranges from 11.0 to 8.6. Reaction is slightly acid to moderately acid. Base saturation by sum of cations ranges from 50 to 70 percent. The content of organic matter ranges from 2 to 9 percent to a depth of 10 inches. Some pedons do not have an A2 horizon.

The A1 horizon has dry color of 10YR 4/3 or 5/3. Moist color is 7.5YR 3/2 or 5YR 3/2. The content of clay ranges from 12 to 15 percent. The content of rock fragments, mostly gravel, ranges from 0 to 15 percent.

The A2 horizon has dry color of 7.5YR 5/4 or 6/4. Moist color is 7.5YR 3/4 or 5YR 3/4. The content of clay ranges from 15 to 18 percent. The content of rock fragments, mostly gravel, ranges from 0 to 15 percent.

The Bt and 2Bt horizons have dry color of 7.5YR 5/4 or 4/4, 5YR 5/4, or 10YR 5/3 in the lower part. Moist color is 7.5YR 3/4, 5YR 3/4, or 10YR 4/3 in the lower part. The content of clay in these horizons ranges from 20 to 35 percent. The content of rock fragments, mostly gravel, ranges from 0 to 15 percent.

The 3BCt horizon has dry color of 10YR 5/3, 4/2, or 5/4; 5YR 3/3; or 7.5YR 5/4. Moist color is 10YR 4/3, 3/2, or 3/4; 5YR 4/4; or 7.5YR 3/4. The texture is very gravelly clay loam or very gravelly sandy clay loam. The content of clay ranges from 27 to 35 percent. The content of rock fragments, mostly weathered gravel, ranges from 35 to 90 percent.

Wyntoon Series

The Wyntoon series consists of very deep, well drained soils that formed in extrusive igneous outwash material. These soils are on hills and terraces. Slopes range from 2 to 30 percent. The mean annual precipitation is 40 to 50 inches, and the mean annual temperature is 47 to 50 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Andic Palexeralfs

Typical Pedon

Wyntoon sandy loam, 2 to 15 percent slopes, about 0.2 mile north of the McCloud River Railroad tracks; 1,900 feet south and 600 feet east of the northwest corner of sec. 34, T. 40 N., R. 1 E., Bartle SE (Bartle) quadrangle (7.5 minute series):

Oi—1 inch to 0; slightly and partially decomposed conifer needles, twigs, and bark.

A1—0 to 2 inches; brown (10YR 4/3) sandy loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and common fine and medium roots; common very fine tubular and interstitial pores; 8 percent gravel 2 to 75 mm in diameter; moderately acid (pH 6.0); abrupt smooth boundary.

A2—2 to 9 inches; brown (7.5YR 4/4) sandy loam, dark brown (7.5YR 3/2) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and medium roots; common very fine tubular and interstitial pores; 9 percent gravel 2 to 75 mm in diameter; slightly acid (pH 6.4); clear smooth boundary.

Bt1—9 to 19 inches; brown (7.5YR 4/4) loam, dark reddish brown (5YR 3/4) moist; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; few very fine and common fine and coarse roots; many very fine and common fine and medium tubular pores; few thin clay films in pores and common thin clay films bridging mineral grains; 8 percent gravel; pebbles are 2 to 75 mm in diameter; neutral (pH 6.6); clear smooth boundary.

Bt2—19 to 25 inches; brown (7.5YR 5/4) loam, dark reddish brown (5YR 3/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and medium and common fine roots; many very fine and common fine and medium tubular pores; many thin clay films on peds and in pores; 7 percent gravel; pebbles are 2 to 75 mm in diameter; neutral (pH 7.0); clear wavy boundary.

2Bt3—25 to 36 inches; light brown (7.5YR 6/4) silty clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and slightly plastic; few fine and medium roots; many very fine, common fine, and few medium pores; many thin clay films on peds and common moderately thick clay films in pores; neutral (pH 7.0); diffuse wavy boundary.

2Bt4—36 to 49 inches; light brown (7.5YR 6/4) clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and slightly plastic; few fine and medium roots; many very fine and common fine tubular pores; many moderately thick clay films on peds and in pores; neutral (pH 7.0); clear smooth boundary.

2Bt5—49 to 58 inches; pink (7.5YR 7/4) clay, strong brown (7.5YR 5/6) moist; moderate medium subangular blocky stucture; very hard, friable, sticky and plastic; few fine roots; many very fine tubular pores; common thin clay films on peds and in pores; neutral (pH 7.0); clear wavy boundary.

2Bt6—58 to 67 inches; reddish yellow (7.5YR 7/6) clay, strong brown (7.5YR 5/6) moist; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; few fine roots; common very fine tubular pores; common thin clay films on peds and in pores; 10 percent gravel; neutral (pH 7.0); clear wavy boundary.

2Bt7—67 to 74 inches; reddish yellow (7.5YR 8/6) clay, strong brown (7.5YR 5/6) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few fine roots; common very fine tubular pores; few thin clay films in pores; neutral (pH 7.0).

The thickness of the solum is more than 60 inches. The particle-size control section (9 to 29 inches) ranges from 20 to 27 percent clay and from 0 to 15 percent rock fragments, mostly gravel. The content of rock fragments on the surface, mostly gravel or cobbles, ranges from 0 to 5 percent.

The A horizon has dry color of 10YR 4/3, 4/4, or 5/4; 7.5YR 4/4, 5/4, 5/6, 6/4, or 6/6; or 5YR 4/4 or 6/4. Moist color is 10YR 2/2 or 3/2; 7.5YR 3/2, 3/4, or 4/4; or 5YR 3/2, 3/3, or 3/4. The dark surface layer is not thick enough to qualify as an umbric epipedon. The content of organic carbon ranges from 1.5 to 4.5 percent. NaF pH is 10 to 11. Reaction ranges from moderately acid to neutral. Base saturation by ammonium acetate ranges from 40 to 50 percent.

Base saturation by sum of cations ranges from 30 to 35 percent. Bulk density ranges from 0.95 to 1.00 g/cc.

The Bt1 and Bt2 horizons have dry color of 10YR 6/8; 7.5YR 4/4, 5/4, or 5/6; or 5YR 4/6. Moist color is 7.5YR or 5YR 3/4, 4/4, or 4/6. The content of organic carbon ranges from 0.6 to 1.0 percent. The content of clay ranges from 20 to 25 percent. NaF pH is 9.5 to 10.5. Reaction ranges from moderately acid to neutral. Base saturation by ammonium acetate ranges from 55 to 70 percent. Base saturation by sum of cations ranges from 40 to 50 percent. Bulk density ranges from 1.1 to 1.3 g/cc.

The 2Bt horizon has dry color of 7.5YR 6/4, 7/4, 7/6, or 8/6. Moist color is 7.5YR 4/4, 4/6, or 5/6 or 5YR 4/4, 4/6, or 5/6. Dry and moist chroma of 6 occurs within a depth of 60 inches. The content of organic matter is 0.3 to 0.5 percent. The texture is clay loam, silty clay loam, or clay. The content of clay ranges from 35 to 50 percent. NaF pH is 9.5 to 10.0. Reaction ranges from moderately acid to neutral. Base saturation by ammonium acetate ranges from 60 to 75 percent. Base saturation by sum of cations ranges from 50 to 60 percent.

Xerorthents

Xerorthents are moderately deep to very deep, well drained soils that formed in colluvium derived from extrusive igneous rock. These soils are on mountain back slopes and escarpments. Slopes range from 50 to 70 percent. The mean annual precipitation is 35 to 60 inches, and the mean annual temperature is 39 to 51 degrees F.

Taxonomic classification: Xerorthents

Representative Pedon

Xerorthents, in an area of Rubble land-Xerorthents complex, 50 to 70 percent slopes, 200 feet north and 3,800 feet east of the southwest corner of sec. 12, T. 39 N., R. 2 W., Lake McCloud quadrangle (7.5 minute series):

A—0 to 3 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 5 percent gravel; moderately acid (pH 6.0); clear smooth boundary.

C1—3 to 22 inches; dark grayish brown (10YR 4/2) cobbly sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, common fine, and few coarse roots; many very fine interstitial and few very fine and fine tubular pores; 5 percent gravel and 15 percent cobbles; moderately acid (pH 6.0); clear wavy boundary.

2C2—22 to 34 inches; brown (10YR 4/3) very cobbly sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, medium, and coarse roots; common very fine interstitial and few fine tubular pores; 15 percent gravel and 30 percent cobbles; moderately acid (pH 6.0); gradual wavy boundary.

2Cr—34 inches; weathered tuff.

The depth to bedrock ranges from 20 to more than 60 inches. Textures, colors, and content of rock fragments are highly variable.

Zeugirdor Series

The Zeugirdor series consists of very deep, well drained soils that formed in uplifted tephra buried by talus from basaltic lava flows. These soils are on mountains. Slopes range from 2 to 50 percent. The mean annual precipitation is 35 to 50 inches, and the mean annual temperature is 39 to 44 degrees F.

Taxonomic classification: Medial-skeletal, mixed, frigid Ultic Haploxerands

Typical Pedon

Zeugirdor, fragmental, soil (fig. 19), in an area of Zeugirdor-Goulder complex, 15 to 30 percent slopes, about 6 miles southeast of Burney; 2,000 feet east and 750 feet north of the southwest corner of sec. 21, T. 34 N., R. 3 E., Burney SW (Burney Mountain West) quadrangle (7.5 minute series):

Oi—2 inches to 0; fresh and slightly decomposed litter of needles and twigs.

C—0 to 11 inches; fragmental material consisting of basaltic andesite; 40 percent gravel, 55 percent cobbles, 5 percent stones; some litter in the interstices; abrupt smooth boundary.

2Ab—11 to 17 inches; brown (7.5YR 5/4) extremely gravelly sandy loam, dark brown (7.5YR 3/4) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few medium and common very fine and fine roots; many very fine interstitial pores; 50 percent gravel and 20 percent cobbles; slightly acid (pH 6.5); abrupt smooth boundary.

2ABb—17 to 26 inches; light brown (7.5YR 6/4) very gravelly sandy loam, dark brown (7.5YR 3/4) moist; weak fine subangular blocky structure;

slightly hard, friable, nonsticky and nonplastic; few very fine and common fine and medium roots; common very fine tubular pores; 45 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); gradual smooth boundary.

3Btb1—26 to 47 inches; reddish yellow (7.5YR 6/6) very gravelly sandy clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; few very fine and common fine roots; common very fine tubular pores; few thin clay films on peds and in pores; 40 percent gravel and 15 percent cobbles; slightly acid (pH 6.5); clear smooth boundary.

3Btb2—47 to 64 inches; very pale brown (10YR 7/4) very cobbly sandy clay loam, strong brown (7.5YR 4/6) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; few fine and medium roots; many very fine tubular pores; few thin clay films in pores; 5 percent gravel and 30 percent cobbles; slightly acid (pH 6.1); clear smooth boundary.

3Btb3—64 to 85 inches; very pale brown (10YR 7/4) very cobbly sandy clay loam, strong brown (7.5YR 5/6) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; few fine and medium roots; many very fine tubular pores; common thin clay films in pores; 5 percent gravel, 30 percent cobbles, 10 percent stones; slightly acid (pH 6.1).

The depth to bedrock is more than 60 inches. The content of rock fragments on the surface, mostly basaltic andesite, ranges from 5 to 20 percent stones, 10 to 60 percent cobbles, and 10 to 30 percent gravel. Base saturation by sum of cations ranges from 15 to 30 percent throughout.

The C horizon is entirely rock fragments, mostly basaltic andesite cobbles or gravel.

The 2Ab horizon has dry color of 7.5YR 4/4 or 5/4. Moist color is 7.5YR 3/4 or 5YR 3/4. The content of organic matter is 2 to 3 percent. The content of clay ranges from 8 to 18 percent. The content of rock fragments, mostly gravel and cobbles, ranges from 60 to 80 percent. NaF pH is 10.0 to 11.5. Aluminum and $^1/_2$ iron by ammonium oxalate ranges from 2 to 4. The content of volcanic glass ranges from 15 to 30 percent.

The 2ABb horizon has dry color of 7.5YR 5/4, 6/4, or 5/6. Moist color is 7.5YR 3/4 or 5YR 3/4. The content of organic matter is 1 to 2 percent. The content of rock fragments, mostly gravel and cobbles, ranges from 35 to 60 percent. NaF pH is 10.0 to 11.0. Aluminum and $^1/_2$ iron by ammonium oxalate ranges from 2 to 4. The content of volcanic glass ranges from 15 to 30 percent.

The 3Btb horizon has dry color of 7.5YR 5/6 or 6/6 or 10YR 7/4. Moist color is 7.5YR 4/4, 4/6, or 5/6 or 5YR 4/6. The content of organic matter is 0.1 to 0.5 percent. The texture is very gravelly sandy clay loam or very cobbly sandy clay loam. The content of clay ranges from 27 to 35 percent. The content of rock fragments, mostly gravel or cobbles, ranges from 35 to 60 percent. NaF pH ranges from 9.5 to 10.0. Reaction is slightly acid or moderately acid.

Formation of the Soils

Soil is a three-dimensional body covering the land surface and supporting plants. This covering has developed through natural formation processes. The processes that influence soil development are the result of the interaction of geologic parent material with living organisms (plants and animals), topography, time, and climate. The interaction of these five soil-forming factors influences the formation of every soil. The relative effect varies from one soil to another and in many instances over short distances. Variations of soil depth and the internal properties from one place to another result from the interaction of these soil-forming factors. Humans have an increasing influence on soil formation through activities that cause changes in the five soil-forming factors.

The survey area has a history dominated by violent volcanic activity. In the paragraphs that follow, the five soil-forming factors are related to the soils in the survey area. Also, the importance of the different physiographic provinces in soil formation is described. Most of the conclusions and comparisons are based on numerous field observations of the soils, vegetation, and precipitation throughout the area. These observations were also compared with laboratory data that have been collected for specific soils.

Climate

Soil formation is influenced by variations in temperature and moisture and their seasonal distribution. These factors are influenced by elevation. Generally, as the elevation increases, the rate of precipitation increases and soil temperatures decrease.

The complex topography of basins, lava plateaus, hills, and mountains within the survey area influences the climate. Two moisture regimes, xeric and aridic, are recognized in the area. Three temperature regimes also are recognized. These are mesic, frigid, and cryic.

Most storms originate from the southwest and move to the east. Therefore, the highest precipitation is in the west (about 60 inches of precipitation) and the lowest is in the east (about 14 inches). As a storm moves to the east, the highest precipitation is in the mountains and a rain shadow area is created in the basins, lava plateaus, and hills. Precipitation on Hachett Mountain, to the west of Burney Basin, is about 50 inches, and precipitation in Burney Basin is about 25 inches. This difference in precipitation occurs within an area of less than 10 miles.

Living Organisms

While the soil itself is not considered to be alive, its mineral and organic components are critical as a substrate for myriads of micro-organisms and macro-organisms. The effective moisture provided to these organisms has had the greatest influence on past and present vegetation. The amount of precipitation combined with elevational changes has influenced the temperature and effective moisture.

Most of the soils on mountains and hills, except in the eastern part of the area, do not show marked differences in development resulting from the aspect of the side slopes within a local area. This fact can be attributed to the recent volcanic material on these slopes, the northeast trend of the mountains and hills, and the high precipitation. However, there is a relative difference as areas are compared from the west to the east or at varying elevations. Site productivity of conifers, an indicator of plant growth, shows a parallel increase as precipitation and elevation increase. This increase in productivity is also reflected by a higher content of organic matter and a thicker surface layer. A comparison of Mounthat and Depner soils provides an example.

Topography

Topography, or relief, influences soil formation through its effect on drainage, runoff, and depth of penetration by soil moisture. The basins, stream terraces, lava plateaus, mountains, and hills throughout the area all have a dominant relief. For example, the basin soils are dominantly nearly level and accumulate runoff and erosional material from the higher landforms. These soils are very poorly

drained, formed in stratified alluvium, and have thick dark surface horizons. Pastolla soils are examples. In contrast, the soils on stream terraces and lava plateaus are dominantly gently sloping to strongly sloping. At least the subsoil has been stable enough for the accumulation of clays. However, because the surface horizon may have been eroded and new material deposited from higher landforms, a different surface horizon may have formed. The shallow Jellycamp soil, for example, has one of the most developed argillic horizons and the thinnest surface layer of all the soils in the survey area.

The soils that formed on mountains are dominantly moderately steep or steep and are nearest to volcanic activity. The material is typically too young for the formation of distinct horizons to have occurred, other than a dark surface layer and a cambic horizon, or the slopes are not stable enough.

Parent Material

Following the building up of mountains (uplifting and folding), mechanical and chemical weathering of exposed bedrock produce a layer of loose broken rock material. On steep slopes, this material is intermittently moved downhill by gravity and water. It can be moved very short distances, or it can be moved long distances to the bottom of the slope or into a steep drainageway.

Parent material is defined as the unconsolidated and more or less chemically weathered mineral or organic matter in which the solum of soils forms as a result of pedogenic processes (Soil Conservation Society of America, 1976). Most of the parent material originated from the process of violent volcanic eruptions and molten lava flows with a minor amount of metamorphic material in the northwestern area and extending to the Montgomery Creek area. Volcanic material is spread over the landscape with no set pattern. Sometimes the direction of the wind determines where the volcanic material will fall. Therefore, it can be said that, with few exceptions, the soils we observe today are not related to the underlying bedrock.

Time

Soil formation begins when the geologic material is exposed to weathering. The earliest exposure of large quantities of extrusive igneous material started about 11 million years ago. Ash and pumice expelled from the many volcanoes throughout the area have been useful as major indicators for tracking the development of the soils.

The silica from ash weathers very rapidly and forms allophane as one of the major clays. During the field mapping for this survey, a field test measuring the pH of sodium fluoride when combined with a small sample of the soil material from each horizon was used. Even though this test is not accepted as an absolute indicator for use in the classification of soils, it has been a very useful tool in this area in combination with the observation of the soil profile characteristics. Consistently throughout the area, the pH of sodium fluoride was the highest at the top of the mountains and the lowest at the base of the mountains and on the lava plateaus.

Time, in combination with the erosional and leaching effects of precipitation, has also influenced the formation of soils. Differences in precipitation can result in the formation of completely different soils over the same period of time. For example, an old soil in an area of low precipitation that has minimal vegetative cover could develop into a shallow soil with a duripan, such as Jellycamp soils; however, an old soil in an area of high precipitation that supports an excessive amount of vegetation could develop into a deep soil with very low base saturation, such as Kettlebelly soils.

Physiographic Provinces

More than 135 million years ago, prior to any extensive volcanic activity, there was a broad depressional area known as the “Lassen Strait” between the Sierra-Nevada-Klamath orogenic belt (Oakeshott, 1971). It was believed that this depression had “...been a seaway in Cretaceous time that connected the marine basin of California with that of East Central Oregon.” After this period, volcanism began to fill this depressional area and started to create the two physiographic provinces known as the Cascade Range and the Modoc Plateau.

The volcanic materials on the Cascade Range and Modoc Plateau range from basalt to rhyolite. They range in age from the Eocene to Recent times (Oakeshott, 1971). The material took the form of lava flow, pumice, ash, and cinders. Some soils may have a combination of these materials. Also, there are minor areas of metamorphic material, such as shale.

Cascade Range

The volcanoes in the Cascade Range are composite cones. That is, they were built up by alternate lava flows and violent explosions (Oakeshott, 1971). Early High Cascades rocks were very fluid basalt and andesite that erupted from

fissures and formed low shield volcanoes and lava flows. Later, these rocks became higher in silica and were more explosive (Oakeshott, 1971). The boundary between the Cascade Range and the Modoc Plateau is not distinct, but three major areas in the Cascade Range that are characterized by different soil composition are the Medicine Lake Highland area, the Shasta-McCloud area, and the Burney area.

Medicine Lake Highland.—The Medicine Lake Highland is the eastern bulge of the Cascade Range. Most of the volcanic activity did not start until about 2,000 years ago. Originally, one shield volcano 20 miles across and 2,500 feet from the base collapsed and formed a basin. Then a whole series of cones built around the slopes. Eruptions of andesite, dacite, and rhyolite then built up masses like Mt. Hoffman and Glass Mountain. Many tests of this material have confirmed these dates. In 1910, there was an observation of a minor eruption of Glass Mountain. This eruption took place approximately 4 years before Mt. Lassen exploded steam and ash and created a large mudflow down its side (California Division of Mines and Geology, 1981).

The pumice and ash in the Medicine Lake Highlands represent the youngest material in the survey area. Most of the material was deposited less than 2,000 years ago, and some minor ash was deposited as recently as 1910 (California Division of Mines and Geology, 1981). Soils with the thickest amount of pumice material in the area are closest to Glass Mountain and Mt. Hoffman. The pumice has covered much of the previous landscape and has buried soils of a previous age.

Also, the particle-size pumice has been sorted as it was carried by the wind and gravity pulled it to the ground. Medlake and Tionesta soils are examples of soils that have a surface layer of coarse pumice material from these exploding cones. The surface layer shows some accumulation of organic matter. However, the pumice and ash show very little signs of weathering, as indicated by a low sodium fluoride pH. The surface material of the Medici and Blankout soils is much finer than that in the Medlake and Tionesta soils. It has had some weathering, as indicated by the higher sodium fluoride pH.

Shasta-McCloud Area.—The birth of Mt. Shasta was approximately 3 million years ago (Oakeshott, 1971). Mt. Shasta is still considered an active volcano. Tests have been run on the varying pyroclastic and mudflows. The latest flow was in 1786 and was observed by many at that time. The earliest andesitic lava tested on Mt. Shasta was created between 170 B.C. and A.D. 230 (California Division of Mines and Geology, 1981).

Glacial outwash and ash from Mt. Shasta were the primary source of materials for Shastina, Shasta, and Ponto soils. As the material eroded from Mt. Shasta, it sorted into varying particle sizes. Shastina soils have the coarsest material, and Ponto soils have the finest material. Generally, Shastina soils are in the highest positions on the landscape, and Ponto soils are in the lowest.

Burney Mountain-Hatchett Mountain Area.—Burney Mountain was formed later than Mt. Shasta (Geological Society of Sacramento, 1980), but the birth of Burney Mountain did not spread as much recent volcanic material as Mt. Shasta and the Medicine Lake Highlands spread over the mountains and lava plateaus. As a result, many of the older soils were left exposed on the Burney Basalt, an extensive lava flow that formed more than 3 million years ago (U.S. Geological Survey, 1966).

The dominant soils in this area, in order of amount of precipitation, that show the changes of effective moisture on vegetation and soil development are Arkright, Burney, Jimmerson, and Wyntoon soils. The influence of recent volcanic material is also expressed in the Wyntoon and Jimmerson soils. Except for the Wyntoon soils, all of these soils are on the lava plateau of Burney Basalt. Precipitation ranges from 16 inches to 60 inches within an area of 20 miles. As the precipitation increases to the west, the base saturation decreases and soil depth and productivity increase. The dominant vegetation changes from ponderosa pine and scattered juniper in the east to Douglas-fir and ponderosa pine in the west.

Soils in the mountains around Burney are similar to those in the Medicine Lake Highland area in terms of development, except that they do not have the high amount of pumice that is found in the soils of the Medicine Lake Highlands area. The fine-earth material is much finer than in the soils of the Medicine Lake Highlands, and the soil colors are not as distinct.

Cinders are another parent material found in minor amounts scattered throughout this area. Twinbuttes are the major soils that formed on recent cindercones. Bunselmeier soils are older Pleistocene soils in areas of drier climate to the east. The effects of time as a soil-forming factor are apparent; the Twinbuttes soils have a weakly developed cambic horizon, and the Bunselmeier soils have an argillic horizon.

The oldest material in the survey area is exposed parent material from the Montgomery Creek

Formation. This parent material is more than 60 million years old. It was exposed when the mountains in this area began to uplift starting about 11 million years ago. Kilarc and Kettlebelly soils are the two major soils that formed in this material.

Kettlebelly soils formed in metamorphic material in areas that have about 60 inches of precipitation. Most of these soils are on slopes of less than 15 percent. It is likely that these soils supported enough vegetation to prevent erosion. The precipitation has leached the bases out of these soils; the base saturation is less than 35 percent throughout the profile.

Modoc Plateau

The Modoc Plateau is a flat-topped upland. It is a rather broad highland area built up of irregular masses of a variety of volcanic materials, predominantly basalt. The surface is characterized by considerable relief as a result of the numerous cones and shield volcanoes scattered over the plateau and extensive block fault systems with largely vertical movements that have created basins, lava plateaus, and mountains (Oakeshott, 1971).

Basins and Related Plateaus.—The volcanic activity was not continuous in the area. Starting at about the end of the Miocene period, erosion destroyed the constructional volcanic landforms of the Cascades and reduced the region to one of erosional hills (U.S. Geological Survey, 1966). Also, after this period it was thought that a great inland freshwater lake was created and that the water drained to the north. Then as volcanic activity began to increase, ash was deposited into this lake and an extensive deposit of Pliocene diatomite was created. This deposit is more than 11 million years old. Block faulting, uplifting, and volcanism began to create the Fall River Valley and Big Valley and the mountains surrounding these valleys to the south, east, and west.

Starting about the Pleistocene Period, many fissures, flows, and shield volcanoes from the north began to close off the valleys.

Since the water could no longer flow north, the Pit River started meandering through the valleys until it reached a weak spot to the south. At this point rapid downcutting took place, which can be seen by the talus slopes on the Pit River west of Fall River Valley. Jadpor soils are composed dominantly of this talus material.

Much of the diatomite was exposed as uplifting occurred. Britton soils are examples of soils that formed in this uplifted material. Because diatomaceous earth is very erosive, only a shallow soil can be formed.

The basins have accumulated erosional material from the higher landforms. Much of the clay content in Pit soils, for example, results from the clay subsoils that eroded from the soils on lava plateaus, such as Jellycamp soils. Also, some soils in the basins show evidence of past explosive activity in the mountains. For example, Pastolla soils have a thin white layer at a depth of about 4 inches. This ash material has the exact composition of the ash and pumice found in the Medicine Lake area.

An example of how microrelief on stream terraces can affect the vegetation and the development of soils is the characteristic mounds and intermounds of the shallow, moderately well drained Dudgen soil and the moderately deep, well drained Graven soil in the Fall River Valley. An examination of the organic matter content in the two soils shows that the Graven soil contains enough organic matter to have a mollic epipedon, but the Dudgen soil does not. The different kinds of vegetation that grew on these two soils and differences in depth and drainage were responsible for the difference in content of organic matter.

A good example of how moisture and elevation affect soil formation on stream terraces is the difference between Dudgen and Graven soils in the Fall River Valley and Bieber and Modoc soils in the Big Valley. Dominantly, the duripan in the Dudgen and Graven soils in the Fall River Valley is only minimally developed. However, the duripan in the Bieber and Modoc soils is strongly developed. This difference in the development of a duripan can be explained by differences in moisture and temperature. The climate in the Fall River Valley is closer to xeric, and that in the Big Valley is closer to aridic.

The oldest soils on the related lava plateaus in the area that have about 14 inches of precipitation are the shallow Bieber and Jellycamp soils. Both of these soils have a claypan and a well developed duripan that is cemented with silica. Also, the mound and intermound topography is typical of surfaces that formed during the Pleiestocene, and the claypan is from an even older soil.

Mountains.—The Big Valley Mountains, which separate the Fall River Valley from the Big Valley, are an example of some of the processes that occurred throughout the area. These mountains were created from a volcano system as the landscape was uplifted.

References

Adams, Paul W., and Henry A. Froehlich. 1981. Compaction of forest soils. U.S. Department of Agriculture, Forest Service, Pacific Northwest Experiment Station Booklet 217.

Albright, Delmer L. 1980. An evaluation of the FMC tracked skidder on Jackson State Forest. California Forestry Note 79.

American Association of State Highway and Transportation Officials (AASHTO). 1986. Standard specifications for highway materials and methods of sampling and testing. 14th edition, 2 volumes.

American Society for Testing and Materials (ASTM). 1993. Standard classification of soils for engineering purposes. ASTM Standard D 2487.

California Division of Mines and Geology. 1981. California geology.

Dunning, Duncan. 1942. A site classification system for the mixed conifer selection forests of the Sierra Nevada. U.S. Department of Agriculture, Forest Service, California Forest and Range Experiment Station Forest Research Note 28.

Fort Crook Historical Society. 1975. Fall River Valley—an examination of historical sources.

Geological Society of Sacramento. 1980. Annual field trip geologic guide to the Modoc Plateau and the Warner Mountains.

McArdle, Richard E., Walter H. Meyer, and Donald Bruce. 1949. The yield of Douglas-fir in the Pacific Northwest. U.S. Department of Agriculture Technical Bulletin 201.

Meyer, Walter H. 1938. Yield of even-aged stands of ponderosa pine. U.S. Department of Agriculture Technical Bulletin 630.

Murray, Lynn, and others. 1973. Black oak management plan—Mendocino National Forest. U.S. Department of Agriculture, Forest Service.

Oakeshott, Gordon B. 1971. California’s changing landscape.

Schumacher, Francis X. 1926. Yield, stand and volume tables for white fir in the California pine region. University of California Bulletin 407.

Shasta County Historical Society. 1977. Shasta County east of Hatchett Mountain.

Soil Conservation Society of America. 1976. Resource conservation glossary.

State of California. 1980. Markets for woodland products in California. Resources Agency, Department of Forestry Land and Forestry Protection.

State of California. 1986. Field manual, soil vegetation surveys in California. Resources Agency, Department of Forestry Land and Forestry Protection.

United States Department of Agriculture. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210.

United States Department of Agriculture. 1981. Land resource regions and major land resource areas of the United States. Soil Conservation Service, U.S. Department of Agriculture Handbook 296.

United States Department of Agriculture. 1993. Soil survey manual. Soil Conservation Service, Soil Survey Staff. U.S. Department of Agriculture Handbook 18.

United States Department of Agriculture. 1996. Keys to soil taxonomy. 7th edition. Natural Resources Conservation Service, Soil Survey Staff.

United States Department of Agriculture. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, Soil Survey Staff. U.S. Department of Agriculture Handbook 436.

United States Geological Survey. 1966. Geology of northern California.

Watson, E.B., and S.W. Cosby. 1924. Soil survey of the Big Valley (California). U.S. Department of Agriculture, Bureau of Soils.

Wells, Carol G. 1978. Effects of fire on soil: A state of knowledge of review. National Fire Effects Workshop, Denver, Colorado.

Wensel, Lee C., and Greg S. Beging. 1987. CACTOS users guide: The California conifer timber output simulator. University of California, Agricultural Experiment Station Bulletin 1920.

Glossary

Aa. A type of lava flow having a rough, fragmental surface. It is a blocky lava consisting of clinkers and scoria and is characteristic of oceanic shield volcanoes and continental plateau eruptions.

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Allophane. An amorphous clay mineral that consists of a hydrous aluminum silicate gel of highly variable composition with minor amounts of bases and accessory acid radicals.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvial plain. A flood plain or a low-gradient delta. It may be modern or relict.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Andesite. A dark, fine grained extrusive rock that, when porphyritic, contains phenocrysts composed primarily of zoned acid plagioclase and one or more of the mafic minerals (e.g., biotite, hornblende, or pyroxene) and a groundmass composed generally of the same minerals as the phenocrysts, although the plagioclase may be more acid and quartz is generally present. The extrusive equivalent of diorite.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Ash (volcanic). Fine pyroclastic material (less than 4 mm in diameter; less than 0.25 mm for fine ash). The term usually refers to the unconsolidated material but is sometimes also used for its consolidated counterpart, or tuff.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 2.5
Low	2.5 to 5.0
Moderate	5.0 to 7.5
High	7.5 to 10
Very high	more than 10

Avalanche chute. The track or path formed by an avalanche.

Back slope. The geomorphic component that forms the steepest inclined surface and principal

element of many hillsides. Back slopes in profile are commonly steep, are linear, and may or may not include cliff segments.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Basalt. A dark colored or medium dark colored, commonly extrusive (locally intrusive as dikes), mafic igneous rock composed chiefly of calcic plagioclase (usually labradorite) and clinopyroxene in a glassy or fine grained groundmass; the extrusive equivalent of gabbro.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Basic igneous rock. An igneous rock having a relatively low silica content, sometimes delimited arbitrarily as less than 54 percent (although the limits vary with different petrologists); e.g., gabbro basalt. Basic rocks are relatively rich in iron, magnesium, and/or calcium and thus include most mafic rocks as well as other rocks.

Basin. A depressed area with no surface outlet or only limited surface outlet. Examples are closed depressions on a glacial till plain, lake basin, river basin, or fault-bordered intermontane structure, such as the Bighorn Basin of Wyoming.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bedrock-floored plain. An extensive, nearly level to gently rolling or moderately sloping area that is underlain by hard bedrock and has slope of 0 to 8 percent.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Board foot. A unit of measure of the wood in lumber, logs, or trees. The amount of wood in a board 1 foot wide, 1 foot long, and 1 inch thick before finishing.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Breccia. A coarse grained, clastic rock composed of angular rock fragments (larger than 2 mm), commonly cemented together in a finer grained matrix of varying composition and origin. The consolidated equivalent of rubble.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channeled. Refers to a drainage area in which natural meandering or repeated branching and convergence of a streambed have created deeply incised cuts, either active or abandoned, in alluvial material.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Cindercone. A conical hill formed by the accumulation of cinders and other scoriaceous ejecta, normally of basaltic or andesitic composition. The steepness of the slopes may differ widely, depending on the coarseness of the ejecta, the height of eruption, the wind velocity, and other factors, but it is normally steeper than 10 degrees.

Cinders. See Tephra.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clayey soil. Silty clay, sandy clay, or clay.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Clearcut. A method of forest harvesting that removes the entire stand of trees in one cutting. Reproduction is achieved artificially or by natural seeding from adjacent stands.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. Mineral or rock particles larger than 2 millimeters in diameter.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Codominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Commercial forest. Forest land capable of producing 20 cubic feet or more per acre per year at the culmination of the mean annual increment.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Congeliturbate. Soil material disturbed by frost action.

Conglomerate. A coarse grained, clastic rock

composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the “Soil Survey Manual.”

Consolidated sandstone. Sandstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry, are not easily crushed, and cannot be textured by the usual field method.

Consolidated shale. Shale that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Debris flow (mudflow). A mass movement process involving rapid flow of highly viscous mixtures of debris, water, and entrapped air. Water content may range to 60 percent. A mudflow is a type of debris flow with clastic particles of sand size and finer.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deep soil. A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diatomaceous earth. White, yellow, or light gray siliceous earth composed predominantly of the opaline frustules of diatoms, accumulated especially in lakes or swamps and containing a great variation in the amount and nature of

impurities, such as sponges, spicules, radiolarian remains, clay minerals, silica sand, and alkaline earths; the unconsolidated equivalent of diatomite.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Dominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. An area of ground at a lower elevation than the surrounding ground and in which water collects and is drained to a closed depression or lake or to a drainageway at a lower elevation. A drainageway may or may not have distinctly incised channels at its upper reaches or throughout its course.

Draw. A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Dune. A mound, ridge, or hill of loose, windblown granular material (generally sand), either bare or covered with vegetation.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endlining. The process of parking the skidding vehicle, either crawler tractor or rubber-tired skidder, in the established skid road and using the cable on the vehicle to winch the logs from the place where they have been felled to the skidding vehicle for the purpose of skidding them to the landing. This procedure is used in steep terrain to minimize disturbance of the forest floor.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more

gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Even aged. Refers to a stand of trees in which only small differences in age occur between the individuals. A range of 20 years is allowed.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan terrace. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

Fast intake (in tables). The rapid movement of water into the soil.

Fault. A fracture or fracture zone of the earth with displacement along one side in respect to the other.

Felling. All of the steps necessary to sever a standing tree from the stump. Most felling is done with a power saw, although the axe and handsaw are still used. A great deal of felling in both the United States and Canada, however, is done by hydraulic saw and shears.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. An area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head out. To form a flower head.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Hummock. A rounded or conical mound or knoll, hillock, or other small elevation. Also, a slight rise of ground above a level surface.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Hydrophyte. A plant that grows in water or in wet or saturated soils.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is

absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lahar. A mudflow composed chiefly of volcaniclastic materials on the flank of a volcano. The debris carried in the flow includes pyroclastic material, blocks from primary lava flows, and epiclastic material.

Lake plain. A surface marking the floor of an extinct lake, filled in by well sorted, stratified sediments.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Lapilli. Pyroclastics that may be either essential, accessory, or accidental in origin, of a size range that has been variously defined within the limits of 1 to 64 mm in diameter. The fragments may be either solidified or still viscous when they land.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Lava flow. A lateral surficial outpouring of molten lava from a vent or a fissure; also, the solidified body of rock that is so formed.

Lava plateau. A broad elevated tableland or flat-topped highland, many hundreds or thousands of square kilometers in extent, underlain by a thick succession of basaltic lava flows resulting from fissure eruptions.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy soil. Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mean annual increment (MAI). The average annual increase in volume of a tree during the entire life of the tree.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Merchantable trees. Trees that are of sufficient size to be economically processed into wood products.

Mesa. A broad, nearly flat topped and commonly isolated upland mass characterized by summit widths that are more than the heights of bounding erosional scarps.

Meta basic. A basic igneous rock that shows evidence of having been subjected to metamorphism.

Meta igneous. An igneous rock that shows evidence of having been subjected to metamorphism.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Metasediment. A sediment or sedimentary rock that shows evidence of having been subjected to metamorphism.

Meta volcanic. A volcanic rock that shows evidence of having been subjected to metamorphism.

Microhigh. An area that is 2 to 12 inches higher than the adjacent microlow.

Microlow. An area that is 2 to 12 inches lower than the adjacent microhigh.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately deep soil. A soil that is 20 to 40 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mound. A low rounded hill of earth, natural or artificial.

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding

lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mudflow. A general term for a mass-movement landform and a process characterized by a flowing mass of predominantly fine grained earth material possessing a high degree of fluidity during movement. If more than half of the solid fraction of such a mass consists of material larger than sand size, the term "debris flow" is preferable.

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Mulch. A natural or artificial layer of plant residue or other materials, such as sand or paper, on the soil surface.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Observed rooting depth. Depth to which roots have been observed to penetrate.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Overstory. The trees in a forest that form the upper crown cover.

Oxbow. The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pediment. A gently sloping erosional surface developed at the foot of a receding hill or mountain slope. The surface may be essentially bare, exposing earth material that extends beneath adjacent uplands; or it may be thinly mantled with alluvium and colluvium.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plateau. An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Porphyry. An igneous rock of any composition that contains conspicuous phenocrysts in a fine grained groundmass; a porphyritic igneous rock. The rock name descriptive of the groundmass composition usually precedes the term; e.g., diorite porphyry.

Potential native plant community. See Climax plant community.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Pumice. A light colored, vesicular, glassy rock commonly having the composition of a rhyolite. It is often sufficiently buoyant to float on water and is economically useful as a light-weight aggregate and as an abrasive. The adjectival form, pumiceous, is usually applied to pyroclastic ejecta.

Pyroclastic. Pertaining to fragmental materials produced by usually explosive, aerial ejection of clastic particles from a volcanic vent. Such materials may accumulate on land or under water.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5

Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Reduced tillage. Only the tillage essential to crop production and prevention of soil damage.

Regeneration. The new growth of a natural plant community, developing from seed.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relict stream terrace. One of a series of platforms in or adjacent to a stream valley that formed prior to the current stream system.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Ridge. A long, narrow elevation of the land surface, typically sharp crested with steep sides and forming an extended upland between valleys. The term is used in areas of both hill and mountain relief.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Riser. The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

Riverwash. Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

Rolling grade. Commonly used in fairly flat terrain to improve surface drainage; involves gradually changing the pitch of the road from one side to the other at predetermined intervals, for example, 100 feet.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Rubble land. Areas in which more than 90 percent of the surface is covered by stones or boulders. Voids contain no soil material and virtually no vegetation other than lichens. The areas commonly are at the base of mountain slopes, but some are on mountain slopes as deposits of cobbles, stones, and boulders left by Pleistocene glaciation or by periglacial phenomena.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salinity. The electrical conductivity of a saline soil. it is expressed, in millimhos per centimeter, as follows:

Nonsaline	0 to 4
Slightly saline	4 to 8
Moderately saline	8 to 16
Strongly saline	more than 16

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sandy soil. Sand or loamy sand.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite. Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Sawlogs. Logs of suitable size and quality for the production of lumber.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Scoria. Vesicular, cindery crust on the surface of andesitic or basaltic lava, the vesicular nature of which is due to the escape of volcanic gases before solidification; it is commonly heavier, darker, and more crystalline than pumice.

Scribner's log rule. A method of estimating the number of board feet that can be cut from a log of a given diameter and length.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shallow soil. A soil that is 10 to 20 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shelterwood system. A forest management system requiring the removal of a stand in a series of cuts so that regeneration occurs under a partial canopy. After regeneration, a final cut removes the shelterwood and allows the stand to develop in the open as an even-aged stand. The system is well suited to sites where shelter is needed for regeneration, and it can aid regeneration of the more intolerant tree species in a stand.

Shoulder slope. The uppermost inclined surface at the top of a hillside. It is the transition zone from the back slope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Site curve. A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for the range of ages on soils that differ in productivity. Each level is represented by a curve. For a 50-year site curve, the basis of the curve is the height of dominant or dominant and codominant trees that are 50 years old or are 50 years old at breast height. For a 100-year site curve, the basis is the height of dominant or dominant and codominant

trees that are 100 years old or are 100 years old at breast height.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Skid trails. Pathways along which logs are dragged to a common site for loading onto a logging truck.

Slash. The branches, bark, treetops, reject logs, and broken or uprooted trees left on the ground after logging.

Slickens. Accumulations of fine textured material, such as material separated in placer-mine and ore-mill operations. Slickens from ore mills commonly consist of freshly ground rock that has undergone chemical treatment during the milling process.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is silty or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 2 percent
Gently sloping	2 to 5 percent
Moderately sloping	5 to 9 percent
Strongly sloping	9 to 15 percent
Moderately steep	15 to 30 percent
Steep	30 to 50 percent
Very steep	50 percent and higher

Classes for complex slopes are as follows:

Nearly level	0 to 2 percent
Undulating	2 to 5 percent
Gently rolling	5 to 9 percent
Rolling	9 to 15 percent
Hilly	15 to 30 percent
Steep	30 to 50 percent
Very steep	50 percent and higher

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slope alluvium. Sediment gradually transported on mountains or hillslopes primarily by alluvial processes and characterized by particle sorting. In a profile sequence, sediments may be distinguished by differences in size and/or specific gravity of coarse fragments and may be separated by stone lines. Sorting of rounded or subrounded gravel or cobbles and burnished peds contrast with unsorted colluvial deposits.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to $Ca^{++} + Mg^{++}$. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Species. A single, distinct kind of plant or animal having certain distinguishing characteristics.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Strath terrace. A surface cut formed by the erosion of hard or semiconsolidated bedrock and thinly mantled with stream deposits.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stream channel. The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor that was produced during a former stage of erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit. A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Tailwater. The water directly downstream of a structure.

Talus. Fragments of rock and other soil material accumulated by gravity at the foot of cliffs or steep slopes.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts

only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Tephra. A collective term for all clastic volcanic materials that are ejected from a vent during an eruption and transported through the air, including volcanic ash, cinders, scoria, pumice, and blocks.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Tertiary. The first period of the Cenozoic Era of geologic time (from approximately 65 million years ago to 2 million years ago). Epoch/series subdivisions, in order of increasing age, are Pliocene, Miocene, Oligocene, Eocene, and Paleocene.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Too arid (in tables). The soil is dry most of the time, and vegetation is difficult to establish.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Trafficability. The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley. An elongated depressional area primarily developed by stream action.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Very deep soil. A soil that is more than 60 inches deep over bedrock or over other material that restricts the penetration of plant roots.

Very shallow soil. A soil that is less than 10 inches deep over bedrock or over other material that restricts the penetration of plant roots.

Volcanic. Pertaining to (1) the deep-seated (igneous) processes by which magma and associated gases rise through the crust and are extruded onto the earth’s surface and into the atmosphere, and (2) the structures, rocks, and landforms produced.

Volcanic breccia. A rock that is composed of accidental or nonvolcanic fragments in a volcanic matrix.

Volcanic glass. A natural glass produced by the cooling of molten lava, or a liquid fraction of it, too rapidly to permit crystallization. Examples are obsidian, pitchstone, sideromelane, and the glassy mesostasis of many extrusive rocks.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth’s surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of

coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Yarding. The process of moving logs from the stump to the machine or a landing while the machine is stationary.

Appendixes

Appendix A is an excerpt from California supplement CA-4 to the National Conservation Planning Manual, dated February 1981, United States Department of Agriculture, Soil Conservation Service.

Appendix B includes guides for assigning land capability classes, subclasses, and units. The original documentation is a California supplement dated November 1969. Any revisions are noted in the appendix.

Appendix C is an edited version of the ratings guides described in the National Soil Survey Handbook, Part 620, dated November 1993, United States Department of Agriculture, Soil Conservation Service. These guides provided the basis for the interpretive ratings given in the tables Recreational development, Building site development, Sanitary facilities, Construction materials, and Water management. Soils are rated for the uses expected to be important or potentially important to users of soil survey information. Ratings for proposed uses are given in terms of limitations and restrictive features. Only the most restrictive features are listed in the tables. Therefore, if a soil is rated severe, only those soil features that cause the soil to be rated severe are given. There may be other limitations that should be overcome if the soil is to be used for a specific purpose. The guides in appendix C show in the first column the properties or features used as criteria for rating the soil for the use. The properties are listed in descending order of estimated importance. In the “Limits” column, limits of the properties are given for rating the soils and for recognizing a restrictive property or properties. In the “Restrictive feature” column, a key phrase indicates the feature causing the problem.

Appendix D is an explanation of the development of the erosion hazard ratings given in the “Detailed Soil Map Units” section.

Appendix E is the ratings guide used to develop the interpretations listed in the woodland management table.

Appendix A.—Prime Farmlands

Prime farmland is land best suited for producing food, forage, fiber, and oilseed crops and also available for these uses (the land could be cropland, pastureland, rangeland, forest land, or other land but not urban builtup land or water). It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops economically when treated and managed, including water management, according to modern farming methods.

Prime farmland meets all of the following criteria:

1. The soils have:

   a. Aquic, udic, ustic, or xeric moisture regimes and an available water capacity of at least 4 inches (10 cm) per 40 to 80 inches (1 to 1.52 meters) of soil to produce the commonly grown cultivated crops (cultivated crops include, but are not limited to, grain, forage, fiber, oilseed, sugarbeets, vegetables, orchard, vineyard, and bush fruit crops) adapted to the region in 7 or more years out of 10; or

   b. Xeric, ustic, aridic, or torric moisture regimes in which the available water capacity is at least 4 inches (10 cm) per 40 to 60 inches (1 to 1.52 meters) of soil and the area has a developed irrigation water supply that is dependable (a dependable water supply is one in which enough water is available for irrigation in 8 out of 10 years for the crops commonly grown) and of adequate quality; and,

2. The soils have a temperature regime that is frigid, mesic, thermic, or hyperthermic (pergelic and cryic regimes are excluded). These are soils that, at a depth of 20 inches (50 cm), have a mean annual temperature higher than 32 degrees F (0 degrees C). In addition, the mean summer temperature at this depth in soils with an O horizon is higher than 47 degrees F (8 degrees C); in soils that have no O horizon, the mean summer temperature is higher than 59 degrees F (15 degrees C); and,
3. The soils have a pH between 4.5 and 8.4 in all horizons within a depth of 40 inches (1 meter); and,
4. The soils either have no water table or have a water table that is maintained at a sufficient depth during the cropping season to allow cultivated crops common to the area to be grown; and,
5. The soils can be managed so that, in all horizons within a depth of 40 inches (1 meter), during part of each year the conductivity of the saturation extract is less than 4 mmhos/cm and the exchangeable sodium percentage (ESP) is less than 15; and,
6. The soils are not flooded frequently during the growing season (less often than once in 2 years); and,
7. The product of K (erodibility factor) x percent slope is less than 2.0; and,
8. The soils have a permeability rate of at least 0.06 inch (0.15 cm) per hour in the upper 20 inches (50 cm) and the mean annual soil temperature at a depth of 20 inches (50 cm) is less than 59 degrees F (15 degrees C); the permeability rate is not a limiting factor if the mean annual soil temperature is 59 degrees F (15 degrees C) or higher; and,
9. Less than 10 percent of the surface layer [upper 6 inches (15 cm)] in these soils consists of rock fragments coarser than 3 inches (7.6 cm); and,
10. The soils have a minimum rooting depth of 40 inches (1 meter).

Appendix B.—Guide for Placing Soils in Capability Classes

Criteria	Capability class							
	I	II	III	IV	V	VI [1]	VII [2]	VIII
Soil depth (in) [3]	≥40	≥40	≥20	≥10	≥20	≥10	Any	Any
ETp 32 degrees F [4]	≥20	≥14	≥10	≥6	≥6	≥4	---	Any
4ETa [5]	≥20	≥16	≥12	≥8	≥8	≥6	≥2	Any
Surface texture (irrigated)	SL-C	LS-C, may be GR	Any, may be GR, CB	Any, may be GRV, CBV, ST [6]	Any, may be GRX, CBX, STV	Any, may be GRX, CBX, STV	Any	Any
Surface texture (nonirrigated)	SL-CL	SL-C, may be GR	SL-C, may be, GR, CB	LS-C, GRV, CBV, ST [6]	Any, may be GRX, CBX, STV	Any, may be GRX, CBX, STV	Any	Any
Permeability (in/hr) [7]	0.2-6.0	0.06-20	<0.06-20	Any	Any	Any	Any	Any
Depth to water table (in) [8]	>60	>36	>20	>20	Any	Any	Any	Any
Available water capacity (in) [9]	≥7.5 avg. AWC ≥0.13 in/in	≥5.0 avg. AWC ≥0.08 in/in	≥3.5 avg. AWC ≥0.06 in/in	≥2.5 avg. AWC ≥0.04 in/in	≥3.0 avg. AWC	≥2.0 avg. AWC	≥1.0 avg. AWC	Any
Slope (%): [10]								
Group A	<2	<5	<8	<15	<2	<25	<50	Any
Group B	<2	<8	<15	<25	<2	<50	<75	Any
Erosion hazard	None or slight	None through moderate	None through high	Any	None or slight	Any	Any	Any
Flooding	None or rare	None through occasional	None through occasional	None through frequent [11]	Any	Any	Any	Any
Salinity/EC x 10 at 25 degrees C (mmhos/cm) [12]	<4	<8	<16	<16	<8	Dryland, <16 Irrigated, any	Any	Any
Alkali ESP [12]	None	<25	<50	<50	<25	Dryland, <25 Irrigated, <50	Any	Any
Toxic substances [13]	None	None or slight	None through moderate	None through moderate	None or slight	Dryland, slight Irrigated, slight through moderate	Any	Any

Guide for Placing Soils in Capability Classes—Continued

Criteria	Capability class							
	I	II	III	IV	V	VI [1]	VII [2]	VIII
Frost-free season (32 degrees F)	≤140 days	≤100 days	≤80 days	≥50 days	Any	Any	Any	Any

[1] Range and woodland mechanical practices can be applied to class VI land.

[2] Range and woodland mechanical practices are impractical on class VII land.

[3] Claypans with permeability of less than 0.06 inch/hour will be treated as limiting the effective depth.

[4] Potential evapotranspiration for the frost-free season above 32 degrees F is a relative index for irrigated frost-sensitive crops. ETp 32 degrees F for Marysville, California, is 33.

[5] Actual evapotranspiration, 4-inch available water capacity, is a relative index for frost-tolerant dryland crops, such as small grain, and for pasture and range. 4ETa for Marysville, California, is 12.

[6] Coarse fragments interfere with tillage but do not prevent cropping.

[7] Permeability of the least permeable subsurface horizon.

[8] Depth to the water table during the growing season.

[9] Available moisture between field capacity and wilting point.

[10] Group A includes soils with K factors of 0.37 or more and soils that are subject to rill and gully erosion, such as soils that formed in granitic material and soils that have a claypan. Other soils are in group B.

[11] Frequent flooding that does not prevent normal cropping.

[12] For salts and alkali to be a major limitation, there should be other soil limitations, such as slow permeability and a high water table.

[13] Such as boron and magnesium, which are leached with difficulty.

Guide for Placing Soils in Capability Subclasses in California—A

(Where wind velocities are low and/or soils are irrigated. Only soils in capability classes II through VIII are assigned to a subclass)

Soil properties	Subclass by slope range			
	0-2%	2-9%	9-15%	15+%
1. Moderately slowly, moderately, moderately rapidly, rapidly, and very rapidly permeable, moderately well drained, well drained, somewhat excessively drained, and excessively drained soils more than 20 inches deep that have the following textures:				
a. Fine and very fine	s	e	e	e
b. Moderately fine	s[1, 2]	e	e	e
c. Medium	s[1, 2]	e	e	e
d. Moderately coarse, with or without a textural B	s[1, 2]	e	e	e
e. Coarse and very coarse, with a textural B	s	e	e	e
f. Coarse and very coarse, with little or no textural B	s	s	s	e
2. Slowly and very slowly permeable soils that are more than 20 inches deep:[3]				
a. Well drained and moderately well drained	s	e	e	e
b. Somewhat poorly drained	w	e	e	e
3. Wet, poorly drained and very poorly drained soils:				
a. Moderately coarse to fine textured (includes claypans and fragipans)	w	w	w	e
b. Coarse textured with little or no textural B[4]	w	w	w	e
c. Deep organic soils[4]	w	w	w	e
4. Excessively drained, somewhat excessively drained, and moderately well drained, shallow and very shallow soils:				
a. 10 to 20 inches deep to bedrock	s	e	e	e
b. 0 to 10 inches deep to bedrock	s	s	s	s[5]

Guide for Placing Soils in Capability Subclasses—A (Continued)

Soil properties	Subclass by slope range			
	0-2%	2-9%	9-15%	15+%
5. Excessively drained, somewhat excessively drained, well drained, and moderately well drained, saline and sodic soils (moderate to severe salinity and sodicity)	s	e	e	e
6. Soils that have a very cobbly, extremely cobbly, very gravelly, extremely gravelly, very stony, or extremely stony surface layer	s	s	s	s[6]
7. Soils that are subject to damaging overflow	w	w	w	e

[1] Where these soils are more than 40 inches deep, they are generally in class I.
[2] Use “c” only for dryland if soil is class I in irrigated areas.
[3] Permeability of the B horizon or control section.
[4] Including somewhat poorly drained soils.
[5] Subclass “e” if slope is more than 50 percent.
[6] Subclass “e” if slope is more than 30 percent.

Guide for Placing Soils in Capability Subclasses in California—B

(Where wind velocities are high and the soils are not irrigated. Only soils in capability classes II through VIII are assigned to a subclass)

Soil properties	Subclass by slope range			
	0-2%	2-9%	9-15%	15+%
1. Moderately slowly, moderately, moderately rapidly, rapidly, and very rapidly permeable, moderately well drained, well drained, somewhat excessively drained, and excessively drained soils more than 20 inches deep that have the following textures:				
a. Fine and very fine	s	e	e	e
b. Moderately fine	e	e	e	e
c. Medium	e	e	e	e
d. Moderately coarse, with or without a textural B	e	e	e	e
e. Coarse and very coarse, with a textural B	e	e	e	e
f. Coarse and very coarse, with little or no textural B	e	e	e	e
2. Slowly and very slowly permeable soils that are more than 20 inches deep:[1]				
a. Well drained and moderately well drained	s	e	e	e
b. Somewhat poorly drained	w	e	e	e
3. Wet, poorly drained and very poorly drained soils:				
a. Moderately coarse to fine textured (includes claypans and fragipans)	w	w	w	e
b. Coarse textured with little or no textural B[2]	w	w	w	e
c. Deep organic soils[2]	w	w	w	e
4. Excessively drained, somewhat excessively drained, and moderately well drained, shallow and very shallow soils:				
a. 10 to 20 inches deep to bedrock	s	s	e	e
b. 0 to 10 inches deep to bedrock	s	s	s	s[3]

Guide for Placing Soils in Capability Subclasses—B (Continued)

Soil properties	Subclass by slope range			
	0-2%	2-9%	9-15%	15+%
5. Excessively drained, somewhat excessively drained, well drained, and moderately well drained, saline and sodic soils (moderate to severe salinity and sodicity)	s	e	e	e
6. Soils that have a very cobbly, extremely cobbly, very gravelly, extremely gravelly, very stony, or extremely stony surface layer	s	s	s	s[4]
7. Soils that are subject to damaging overflow	w	w	w	e

[1] Permeability of the B horizon or control section.

[2] Including somewhat poorly drained soils.

[3] Subclass "e" if slope is more than 50 percent.

[4] Subclass "e" if slope is more than 30 percent.

Appendix C.—Criteria Used in Rating Soils for Selected Uses

The following tables show the criteria used in rating soils for selected uses in tables 10, 11, 12, 13, and 14 in this survey. Soils are rated for the uses expected to be important or potentially important to users of soil survey information. Ratings for proposed uses are given in terms of limitations and restrictive features. Only the most restrictive features are listed in the tables. Therefore, if a soil is rated severe, only those soil features that cause the soil to be rated severe are given. There may be other limitations that should be overcome if the soil is to be used for a specific purpose.

The first column in the guides in this appendix shows the properties or features used as criteria for rating the soil for the use. The properties are listed in descending order of estimated importance. In the “Limits” column, limits of the properties are given for rating the soils and for recognizing a restrictive property or properties. In the “Restrictive feature” column, a key phrase indicates the feature causing the problem.

Camp Areas

Property	Limits			Restrictive feature
	Slight	Moderate	Severe	
1. USDA texture	---	---	Ice	Permafrost.
2. Flooding	None	---	Rare, common	Flooding.
3. Slope (percent)	<8	8-15	>15	Slope.
4. USDA texture modifier (surface layer)	---	STV, BYV, CB, FL	STX, BYX, CBX, FLX, CBV, FLV, CNX, CRX, SHX, SYX	Large stones.
5. Coarse fragments in the surface layer (percent)[1]	<25	25-50	>50	Small stones.
6. Depth to high water table (feet)	---	---	+	Ponding.
	>2.5	1.5-2.5	<1.5	Wetness.
7. Permeability in the upper 40 inches (in/hr)[2]	>0.6	0.06-0.6	<0.06	Percs slowly.
8. USDA texture (surface layer)[2]	---	---	SC, SIC, C	Too clayey.
9. Unified (surface layer)	---	---	PT	Excess humus.
10. USDA texture (surface layer)	---	LCOS, VFS, [3] LFS, [3] LS	COS, S, FS	Too sandy.
11. Depth to bedrock (inches)	---	---	<20	Depth to rock.
12. Depth to cemented pan (inches)	---	---	<20	Cemented pan.
13. USDA texture (surface layer)[4]	---	SIL, SI, VFSL, L	---	Dusty.
14. Sodium adsorption ratio in the upper 40 inches or great group or phase	---	---	>12 (natric, halic, alkali phases)	Excess sodium.
15. Salinity in the surface layer (mmhos/cm)	<4	4-8	>8	Excess salt.
16. Soil reaction (pH in the surface layer)	---	---	<3.6	Too acid.
17. Other	---	---	(5)	Fragile.

[1] 100 minus percent passing No. 10 sieve.

[2] Rate soils in UST, TOR, ARID, BOR, or XER suborders, great groups, or subgroups one class better.

[3] Rate *slight* if finer textured material is within 20 inches of the surface.

[4] Disregard unless soil is in TOR, ARID, or XER suborders, great groups, or subgroups.

[5] If the soil is easily damaged by use or disturbance, rate *severe—fragile.*

Picnic Areas

Property	Limits			Restrictive feature
	Slight	Moderate	Severe	
1. USDA texture	---	---	Ice	Permafrost.
2. Slope (percent)	<8	8-15	>15	Slope.
3. Flooding	None, rare, occasional	Frequent	---	Flooding.
4. Depth to high water table (feet)	--- >2.5	--- 1.0-2.5	+ <1.0	Ponding. Wetness.
5. USDA texture modifier (surface layer)	---	STV, BYV, CB, FL	STX, BYX, CBX, FLX, CBV, FLV, CNX, CRX, SHX, SYX	Large stones.
6. USDA texture (surface layer) [1]	---	---	SC, SIC, C	Too clayey.
7. USDA texture (surface layer)	---	LCOS, VFS,[2] LFS, [2] LS	COS, S, FS	Too sandy.
8. Unified (surface layer)	---	---	PT	Excess humus.
9. Coarse fragments in the surface layer (percent) [3]	<25	25-50	>50	Small stones.
10. Sodium adsorption ratio in the upper 40 inches or great group or phase	---	---	>12 (natric, halic, alkali phases)	Excess sodium.
11. Salinity in the surface layer (mmhos/cm)	<4	4-8	>8	Excess salt.
12. Soil reaction (pH) in the surface layer	---	---	<3.6	Too acid.
13. Permeability in the upper 40 inches (in/hr) [1]	>0.6	0.06-0.6	<0.06	Percs slowly.
14. USDA texture (surface layer) [4]	---	SIL, SI, VFSL, L	---	Dusty.
15. Depth to bedrock (inches)	---	---	<20	Depth to rock.
16. Depth to cemented pan (inches)	---	---	<20	Cemented pan.
17. Other	---	---	(5)	Fragile.

[1] Rate soils in UST, TOR, ARID, BOR, or XER suborders, great groups, or subgroups one class better.
[2] Rate *slight* if finer textured material is within 20 inches of the surface.
[3] 100 minus percent passing No. 10 sieve.
[4] Disregard unless soil is in TOR, ARID, or XER suborders, great groups, or subgroups.
[5] If the soil is easily damaged by use or disturbance, rate *severe—fragile.*

Playgrounds

Property	Limits			Restrictive feature
	Slight	Moderate	Severe	
1. USDA texture	---	---	Ice	Permafrost.
2. USDA texture modifier (surface layer)	---	ST	STV, STX, BYV, BYX, CB, CBV, FL, FLV, BY, CBX, CNX, CRX, FLX, SHX, SYX	Large stones.
3. Slope (percent)	<2	2-6	>6	Slope.
4. Coarse fragments in the surface layer (percent) [1]	<10	10-25	>25	Small stones.
5. USDA texture (surface layer) [2]	---	---	SC, SIC, C	Too clayey.
6. USDA texture (surface layer)	---	LCOS, VFS, [3] LFS, [3] LS	COS, S, FS	Too sandy.
7. Unified (surface layer)	---	---	PT	Excess humus.
8. Depth to high water table (feet)	--- >2.5	--- 1.5-2.5	+ <1.5	Ponding. Wetness.
9. Flooding	None, rare	Occasional	Frequent	Flooding.
10. Depth to bedrock (inches)	>40	[4] 20-40	<20	Depth to rock.
11. Depth to cemented pan (inches)	>40	[4] 20-40	<20	Cemented pan.
12. Permeability in the upper 40 inches (in/hr) [2]	>0.6	0.06-0.6	<0.06	Percs slowly.
13. USDA texture (surface layer) [5]	---	SIL, SI, VFSL, L	---	Dusty.
14. Sodium adsorption ratio in the upper 40 inches or great group or phase	---	---	>12 (natric, halic, alkali phases)	Excess sodium.
15. Salinity in the surface layer (mmhos/cm)	<4	4-8	>8	Excess salt.
16. Soil reaction (pH) in the surface layer	---	---	<3.6	Too acid.
17. Other	---	---	(6)	Fragile.

[1] 100 minus percent passing No. 10 sieve.
[2] Rate soils in UST, TOR, ARID, BOR, or XER suborders, great groups, or subgroups one class better.
[3] Rate *slight* if finer textured material is within 20 inches of the surface.
[4] Rate *slight* if slopes are 0 to 2 percent.
[5] Disregard unless soil is in TOR, ARID, or XER suborders, great groups, or subgroups.
[6] If the soil is easily damaged by use or disturbance, rate *severe—fragile.*

Paths and Trails

Property	Limits: Slight	Limits: Moderate	Limits: Severe	Restrictive feature
1. USDA texture	---	---	Ice	Permafrost.
2. Fraction greater than 3 inches in the surface layer (percent by weight)	<25	25-50	>50	Large stones.
3. Depth to high water table (feet)	---	---	+	Ponding.
	>2	1-2	<1	Wetness.
4. USDA texture (surface layer)[1]	---	---	SC, SIC, C	Too clayey.
5. USDA texture (surface layer)	---	LCOS, VFS, [2] LFS, [2] LS	COS, S, FS	Too sandy.
6. Unified (surface layer)	---	---	PT	Excess humus.
7. Slope (percent)	<15	15-25	>25	Slope.
8. Erosion factor K (surface layer)	---	---	[3] >.3	Erodes easily.
9. Coarse fragments in the surface layer (percent by weight)[4]	---	---	>65	Small stones.
10. Flooding	None, rare, occasional	Frequent	---	Flooding.
11. USDA texture (surface layer)[5]	---	SIL, SI, VFSL, L	---	Dusty.
12. Other	---	---	(6)	Fragile.

[1] Rate soils in UST, TOR, ARID, BOR, or XER suborders, great groups, or subgroups one class better.
[2] Rate *slight* if finer textured material is within 20 inches of the surface.
[3] Disregard if slopes are 8 percent or less.
[4] 100 minus percent passing No. 10 sieve.
[5] Disregard unless soil is in TOR, ARID, or XER suborders, great groups, or subgroups.
[6] If the soil is easily damaged by use or disturbance, rate *severe—fragile.*

Septic Tank Absorption Fields

Property	Limits			Restrictive feature
	Slight	Moderate	Severe	
1. USDA texture	---	---	Ice	Permafrost.
2. Total subsidence (inches)	---	---	>24	Subsides.
3. Flooding	None	Rare	Common	Flooding.
4. Depth to bedrock (inches)	>72	40-72	<40	Depth to rock.
5. Depth to cemented pan (inches)	>72	40-72	<40	Cemented pan.
6. Depth to high water table (feet)	---	---	+	Ponding.
	>6	4-6	<4	Wetness.
7. Permeability (in/hr):				
24 to 60 inches	2.0-6.0	[1] 0.6-2.0	<0.6	Percs slowly.
24 to 40 inches	---	---	>6.0	Poor filter.
8. Slope (percent)	<8	8-15	>15	Slope.
9. Fraction greater than 3 inches (percent by weight) [2]	<25	25-50	>50	Large stones.
10. Downslope movement	---	---	(3)	Slippage.
11. Formation of pits	---	---	(4)	Pitting.

[1] Recheck to see if rating should be *slight.*

[2] Weighted average to 40 inches.

[3] If the soil is susceptible to movement downslope when loaded, excavated, or wet, rate *severe—slippage.*

[4] If the soil is susceptible to the formation of pits caused by the melting of ground ice when the ground cover is removed, rate *severe—pitting.*

Sewage Lagoons

Property	Limits			Restrictive feature
	Slight	Moderate	Severe	
1. USDA texture	---	---	Ice	Permafrost.
2. Permeability between 12 and 60 inches (in/hr)	<0.6	0.6-2.0	>2.0	Seepage.
3. Depth to bedrock (inches)	>60	40-60	<40	Depth to rock.
4. Depth to cemented pan	>60	40-60	<40	Cemented pan.
5. Flooding	None, rare	---	Common [1]	Flooding.
6. Slope (percent)	<2	2-7	>7	Slope.
7. Unified (any depth)	---	OL, OH	PT	Excess humus.
8. Depth to high water table (feet)	---	---	+	Ponding.
	>5	[2] 3.5-5	[2] <3.5	Wetness.
9. Fraction greater than 3 inches (percent by weight) [3]	<20	20-35	>35	Large stones.
10. Downslope movement	---	---	(4)	Slippage.
11. Formation of pits	---	---	(5)	Pitting.
12. Differential settling	---	---	(6)	Unstable fill.

[1] If floodwater will not enter or damage the sewage lagoon because of low velocity and a water depth of less than 5 feet, disregard flooding.

[2] If the floor of the sewage lagoon has a layer at least 20 inches thick with permeability of less than 0.2 in/hr, disregard wetness.

[3] Weighted average to 20 inches.

[4] If the soil is susceptible to movement downslope when loaded, excavated, or wet, rate *severe—slippage*.

[5] If the soil is susceptible to the formation of pits caused by the melting of ground ice when the ground cover is removed, rate *severe—pitting*.

[6] If the soil is susceptible to differential settling, rate *severe—unstable fill*.

Sanitary Landfill (Trench)

Property	Limits: Slight	Limits: Moderate	Limits: Severe	Restrictive feature
1. USDA texture	---	---	Ice	Permafrost.
2. Flooding	None	Rare	Common	Flooding.
3. Depth to bedrock (inches)	---	---	<72	Depth to rock.
4. Depth to cemented pan (inches):				
Thick	---	---	<72	Cemented pan.
Thin	---	<72	---	Cemented pan.
5. Permeability of bottom layer (in/hr) [1]	---	---	>2.0	Seepage.
6. Depth to high water table (feet)	---	---	+	Ponding.
Apparent	---	---	<6	Wetness.
Perched	>4	2-4	<2	Wetness.
7. Slope (percent)	<8	8-15	>15	Slope.
8. USDA texture [1] [2] [3]	---	CL, SC, SICL	SIC, C	Too clayey.
9. USDA texture [3]	---	LCOS, LS, LFS, LVFS	COS, S, FS, VFS, SG	Too sandy.
10. Unified [3]	---	---	OL, OH, PT	Excess humus.
11. Fraction greater than 3 inches (percent by weight) [4]	<20	20-35	>35	Large stones.
12. Sodium adsorption ratio in the upper 40 inches or great group or phase [1]	---	---	>12 (natric, halic, alkali phases)	Excess sodium.
13. Soil reaction (pH) at any depth	---	---	<3.6	Too acid.
14. Salinity at any depth (mmhos/cm)	---	---	>16	Excess salt.
15. Downslope movement	---	---	[5]	Slippage.
16. Differential settling	---	---	[6]	Unstable fill.

[1] Disregard in all Aridisols except Salorthids and Aquic subgroups, in all Aridic subgroups, and in all Torri great groups of Entisols except Aquic subgroups.

[2] Rate one class better if the soil is in kaolinitic family and experience confirms.

[3] Thickest layer between 10 and 60 inches.

[4] Weighted average to 60 inches.

[5] If the soil is susceptible to movement downslope when loaded, excavated, or wet, rate *severe—slippage*.

[6] If the soil is susceptible to differential settling, rate *severe—unstable fill*.

Sanitary Landfill (Area)

Property	Limits			Restrictive feature
	Slight	Moderate	Severe	
1. USDA texture	---	---	Ice	Permafrost.
2. Flooding	None	Rare	Common	Flooding.
3. Depth to bedrock (inches) [1]	>60	40-60	<40	Depth to rock.
4. Depth to cemented pan (inches) [1]	>60	40-60	<40	Cemented pan.
5. Permeability between 20 and 40 inches (in/hr) [1]	---	---	>2.0	Seepage.
6. Depth to high water table (feet)	---	---	+	Ponding.
Apparent	>5	3.5-5	<3.5	Wetness.
Perched	>3	1.5-3	<1.5	Wetness.
7. Slope (percent)	<8	8-15	>15	Slope.
8. Downslope movement	---	---	(2)	Slippage.
9. Formation of pits	---	---	(3)	Pitting.
10. Differential settling	---	---	(4)	Unstable fill.

[1] Disregard in all Aridisols except Salorthids and Aquic subgroups, in all Aridic subgroups, and in all Torri great groups of Entisols except Aquic subgroups.

[2] If the soil is susceptible to movement downslope when loaded, excavated, or wet, rate *severe—slippage*.

[3] If the soil is susceptible to the formation of pits caused by the melting of ground ice when the ground cover is removed, rate *severe—pitting*.

[4] If the soil is susceptible to differential settling, rate *severe—unstable fill*.

Daily Cover for Landfill

Property	Limits			Restrictive feature
	Good	Fair	Poor	
1. USDA texture	---	---	Ice	Permafrost.
2. Depth to bedrock (inches)	>60	40-60	<40	Depth to rock.
3. Depth to cemented pan (inches)	>60	40-60	<40	Cemented pan.
4. Unified [1]	---	---	SP, SW, SP-SM, SW-SM, GP, GW, GP-GM, GW-GM	Seepage.
5. USDA texture [1 2 3]	---	CL, SICL, SC	SIC, C	Too clayey.
6. USDA texture [1]	---	LCOS, LS, LFS, VFS	S, FS, COS, SG	Too sandy.
7. Unified [1 3]	---	---	OL, OH, CH, MH	Hard to pack.
8. Coarse fragments (percent) [1 4]	<25	25-50	>50	Small stones.
9. Fraction greater than 3 inches (percent by weight) [1 4]	<25	25-50	>50	Large stones.
10. Slope (percent)	<8	8-15	>15	Slope.
11. Depth to high water table (feet)	--- >3.5	--- 1.5-3.5	+ <1.5	Ponding. Wetness.
12. Unified [1]	---	---	PT	Excess humus.
13. Layer thickness (inches)	>60	40-60	<40	Thin layer.
14. Soil reaction (pH) [1]	---	---	<3.6	Too acid.
15. Salinity in the upper 60 inches (mmhos/cm) [2]	---	---	>16	Excess salt.
16. Sodium adsorption ratio or great group or phase [1 2]	---	---	>12 (halic, natric, alkali phases)	Excess sodium.
17. Carbonates	---	---	(5)	Excess lime.

[1] Thickest layer between 10 and 60 inches.

[2] Disregard in all Aridisols except Salorthids and Aquic subgroups, in all Aridic subgroups, and in all Torri great groups of Entisols except Aquic subgroups.

[3] Rate one class better if the soil is in kaolinitic family and experience confirms.

[4] 100 minus percent passing No. 10 sieve, plus fraction greater than 3 inches. Use dominant condition or restrictive feature.

[5] If the amount of carbonate is so high that plant growth is restricted, rate *poor—excess lime.*

Shallow Excavations

Property	Limits			Restrictive feature
	Slight	Moderate	Severe	
1. USDA texture	---	---	Ice	Permafrost.
2. Depth to bedrock (inches):				
Hard	>60	40-60	<40	Depth to rock.
Soft	>40	20-40	<20	Depth to rock.
3. Depth to cemented pan (inches):				
Thick	>60	40-60	<40	Cemented pan.
Thin	>40	20-40	<20	Cemented pan.
4. USDA texture (20 to 60 inches)	---	[1] SI	COS, S, FS, VFS, LCOS, LS, LFS, LVFS, G, SG	Cutbanks cave.
5. USDA texture (20 to 60 inches)	---	C, SIC	---	Too clayey.
6. Soil order	---	---	Vertisols	Cutbanks cave.
7. Bulk density between depths of 20 and 60 inches (g/cc)	---	>1.8	---	Dense layer.
8. Unified (20 to 60 inches)	---	---	OL, OH, PT	Excess humus.
9. Fraction greater than 3 inches (percent by weight) [2]	<25	25-50	>50	Large stones.
10. Depth to high water table (feet)	---	---	+	Ponding.
	>6	2.5-6	<2.5	Wetness.
11. Flooding	None, rare	Common	---	Flooding.
12. Slope (percent)	<8	8-15	>15	Slope.
13. Downslope movement	---	---	(3)	Slippage.

[1] In areas of loess, rating should be *slight.*

[2] Weighted average to 40 inches.

[3] If the soil is susceptible to movement downslope when loaded, excavated, or wet, rate *severe—slippage.*

Dwellings Without Basements

Property	Limits			Restrictive feature
	Slight	Moderate	Severe	
1. USDA texture	---	---	Ice	Permafrost.
2. Total subsidence (inches)	---	---	>12	Subsides.
3. Flooding	None	---	Rare, common	Flooding.
4. Depth to high water table (feet)	--- >2.5	--- 1.5-2.5	+ <1.5	Ponding. Wetness.
5. Shrink-swell potential [1]	Low	Moderate	High, very high	Shrink-swell.
6. Unified [1]	---	---	OL, OH, PT	Low strength.
7. Slope (percent)	<8	8-15	>15	Slope.
8. Depth to bedrock (inches):				
Hard	>40	20-40	<20	Depth to rock.
Soft	>20	<20	---	Depth to rock.
9. Depth to cemented pan (inches):				
Thick	>40	20-40	<20	Cemented pan.
Thin	>20	<20	---	Cemented pan.
10. Fraction greater than 3 inches (percent by weight) [2]	<25	25-50	>50	Large stones.
11. Downslope movement	---	---	(3)	Slippage.
12. Formation of pits	---	---	(4)	Pitting.
13. Differential settling	---	---	(5)	Unstable fill.

[1] Thickest layer between 10 and 40 inches.

[2] Weighted average to 40 inches.

[3] If the soil is susceptible to movement downslope when loaded, excavated, or wet, rate *severe—slippage*.

[4] If the soil is susceptible to the formation of pits caused by the melting of ground ice when the ground cover is removed, rate *severe—pitting*.

[5] If the soil is susceptible to differential settling, rate *severe—unstable fill*.

Dwellings With Basements

	Limits			Restrictive feature
	Slight	Moderate	Severe	
1. USDA texture	---	---	Ice	Permafrost.
2. Total subsidence (inches)	---	---	>12	Subsides.
3. Flooding	None	---	Rare, common	Flooding.
4. Depth to high water table (feet)	--- >6	--- 2.5-6	+ <2.5	Ponding. Wetness.
5. Depth to bedrock (inches):				
Hard	>60	40-60	<40	Depth to rock.
Soft	>40	20-40	<20	Depth to rock.
6. Depth to cemented pan (inches):				
Thick	>60	40-60	<40	Cemented pan.
Thin	>40	20-40	<20	Cemented pan.
7. Slope (percent)	<8	8-15	>15	Slope.
8. Shrink-swell potential [1]	Low	Moderate	High, very high	Shrink-swell.
9. Unified (bottom layer)	---	---	OL, OH, PT	Low strength.
10. Fraction greater than 3 inches (percent by weight) [2]	<25	25-50	>50	Large stones.
11. Downslope movement	---	---	(3)	Slippage.
12. Formation of pits	---	---	(4)	Pitting.
13. Differential settling	---	---	(5)	Unstable fill.

[1] Thickest layer between 10 and 60 inches.
[2] Weighted average to 40 inches.
[3] If the soil is susceptible to movement downslope when loaded, excavated, or wet, rate *severe—slippage*.
[4] If the soil is susceptible to the formation of pits caused by the melting of ground ice when the ground cover is removed, rate *severe—pitting*.
[5] If the soil is susceptible to differential settling, rate *severe—unstable fill*.

Small Commercial Buildings

Property	Limits			Restrictive feature
	Slight	Moderate	Severe	
1. USDA texture	---	---	Ice	Permafrost.
2. Total subsidence (inches)	---	---	>12	Subsides.
3. Flooding	None	---	Rare, common	Flooding.
4. Depth to high water table (feet)	--- >2.5	--- 1.5-2.5	+ <1.5	Ponding. Wetness.
5. Shrink-swell potential [1]	Low	Moderate	High, very high	Shrink-swell.
6. Slope (percent)	<4	4-8	>8	Slope.
7. Unified [1]	---	---	OL, OH, PT	Low strength.
8. Depth to bedrock (inches):				
Hard	>40	20-40	<20	Depth to rock.
Soft	>20	<20	---	Depth to rock.
9. Depth to cemented pan (inches):				
Thick	>40	20-40	<20	Cemented pan.
Thin	>20	<20	---	Cemented pan.
10. Fraction greater than 3 inches (percent by weight) [2]	<25	25-50	>50	Large stones.
11. Downslope movement	---	---	(3)	Slippage.
12. Formation of pits	---	---	(4)	Pitting.
13. Differential settling	---	---	(5)	Unstable fill.

[1] Thickest layer between 10 and 40 inches.

[2] Weighted average to 40 inches.

[3] If the soil is susceptible to movement downslope when loaded, excavated, or wet, rate *severe—slippage*.

[4] If the soil is susceptible to the formation of pits caused by the melting of ground ice when the ground cover is removed, rate *severe—pitting*.

[5] If the soil is susceptible to differential settling, rate *severe—unstable fill*.

Local Roads and Streets

Property	Limits			Restrictive feature
	Slight	Moderate	Severe	
1. USDA texture	---	---	Ice	Permafrost.
2. Total subsidence (inches)	---	---	>12	Subsides.
3. Depth to bedrock (inches):				
Hard	>40	20-40	<20	Depth to rock.
Soft	>20	<20	---	Depth to rock.
4. Depth to cemented pan (inches):				
Thick	>40	20-40	<20	Cemented pan.
Thin	>20	<20	---	Cemented pan.
5. Shrink-swell potential [1]	Low	Moderate	High, very high	Shrink-swell.
6. AASHTO group index number [1 2 3]	<5	5-8	>8	Low strength.
7. Depth to high water table (feet)	---	---	+	Ponding.
	>2.5	1.0-2.5	<1.0	Wetness.
8. Slope (percent)	<8	8-15	>15	Slope.
9. Flooding	None	Rare	Common	Flooding.
10. Potential for frost action	Low	Moderate	High	Frost action.
11. Fraction greater than 3 inches (percent by weight) [4]	<25	25-50	>50	Large stones.
12. Downslope movement	---	---	(5)	Slippage.
13. Formation of pits	---	---	(6)	Pitting.
14. Differential settling	---	---	(7)	Unstable fill.

[1] Thickest layer between 10 and 40 inches.

[2] GIN = (F-35)[.2 + .005(LL-40)] + .01 (F-15)(PI-10) where F = percent passing No. 200 sieve. If F is $\leq$35 and PI is $\geq$11, use only part 2 of equation. Use median values.

[3] Rate one class better if the soil is in a kaolinitic family and experience confirms.

[4] Weighted average to 40 inches.

[5] If the soil is susceptible to movement downslope when loaded, excavated, or wet, rate *severe—slippage*.

[6] If the soil is susceptible to the formation of pits caused by the melting of ground ice when the ground cover is removed, rate *severe—pitting*.

[7] If the soil is susceptible to differential settling, rate *severe—unstable fill*.

Lawns, Landscaping, and Golf Fairways

Property	Limits: Slight	Limits: Moderate	Limits: Severe	Restrictive feature
1. USDA texture	---	---	Ice	Permafrost.
2. Salinity in the surface layer (mmhos/cm)	<4	4-8	>8	Excess salt.
3. Sodium adsorption ratio in the upper 40 inches or great group or phase	---	---	>12 (halic, natric, alkali phases)	Excess sodium.
4. Soil reaction (pH) in the surface layer	---	---	>3.6	Too acid.
5. Sulfidic materials (great group)	---	---	Sulfaquents, Sulfihemists	Excess sulfur.
6. Coarse fragments in the surface layer (percent by weight) [1]	<25	25-50	>50	Small stones.
7. Fraction greater than 3 inches in the surface layer (percent by weight)	<5	5-30	>30	Large stones.
8. Depth to high water table (feet)	---	---	+	Ponding.
	>2	1-2	<1	Wetness.
9. Available water capacity (in/in) [2]	>.10	.05-.10	<.05	Droughty.
10. Flooding	None, rare	Occasional	Frequent	Flooding.
11. Slope (percent)	<8	8-15	>15	Slope.
12. Depth to bedrock (inches)	>40	20-40	<20	Depth to rock.
13. Depth to cemented pan (inches)	>40	20-40	<20	Cemented pan.
14. USDA texture (surface layer) [3]	---	---	SIC, C, SC	Too clayey.
15. USDA texture (surface layer)	---	---	FB, HM, MUCK, SP, MPT, PEAT	Excess humus.
16. USDA texture (surface layer)	---	LCOS, S	COS	Too sandy.
17. Carbonates	---	---	[4]	Excess lime.

[1] 100 minus percent passing No. 10 sieve.

[2] Weighted average to 40 inches.

[3] Rate one class better if the soil is in a kaolinitic family and experience confirms.

[4] If the amount of carbonate is so high that plant growth is restricted, rate *severe—excess lime.*

Roadfill

Property	Limits: Good	Limits: Fair	Limits: Poor	Restrictive feature
1. USDA texture	---	---	Ice	Permafrost.
2. Depth to bedrock (inches)	>60	40-60	<40	Depth to rock.
3. Depth to thick cemented pan (inches)	>60	40-60	<40	Cemented pan.
4. Shrink-swell potential [1]	Low	Moderate	High, very high	Shrink-swell.
5. AASHTO group index number [1 2 3]	<5	5-8	>8	Low strength.
6. Layer thickness (inches)	>60	30-60	<30	Thin layer.
7. Fraction greater than 3 inches (percent by weight) [4]	<25	25-50	>50	Large stones.
8. Depth to high water table (feet)	>3	1-3	<1	Wetness.
9. Slope (percent)	<15	15-25	>25	Slope.
10. Content of gypsum (percent)	---	10-15	>15	Excess gypsum.

[1] Evaluate the thickest layer between 10 and 60 inches and also the bottom layer. Choose the best rating. When rating is based on the bottom layer, verify thickness.

[2] GIN = (F-35)[.2 + .005(LL-40)] + .01 (F-15)(PI-10) where F = percent passing No. 200 sieve. If F is $\leq$35 and PI is $\geq$11, use only part 2 of equation. Use median values.

[3] Rate one class better if the soil is in a kaolinitic family and experience confirms.

[4] Weighted average to 40 inches.

Sand

Property	Limits		Restrictive feature
	Probable source	Improbable source	
1. USDA texture	---	Ice	Permafrost.
2. Unified [1]	SW, SP, SW-SM, SP-SM	---	---
	[2] GW, [2] GP, [2] GW-GM, [2] GP-GM	---	---
	---	[3] GW, [3] GP, [3] GW-GM, [3] GP-GM	Small stones.
	---	PT	Excess humus.
	---	All other	Excess fines.
3. Layer thickness (inches)	>36	<36	Thin layer.
4. Fraction greater than 3 inches (percent by weight) [4]	<50	>50	Large stones.

[1] Evaluate the thickest layer between 10 and 60 inches and also the bottom layer. Choose the best rating. When rating is based on the bottom layer, verify thickness.

[2] Percent passing No. 4 sieve minus percent passing No. 200 sieve is greater than 25.

[3] Percent passing No. 4 sieve minus percent passing No. 200 sieve is less than 25.

[4] Thickest layer between 10 and 60 inches.

Gravel

Property	Limits: Probable source	Limits: Improbable source	Restrictive feature
1. USDA texture	---	Ice	Permafrost.
2. Unified [1]	GW, GP, GW-GM, GP-GM	---	---
	[2] SW, [2] SP, [2] SW-SM, [2] SP-SM	[3] SW, [3] SP, [3] SW-SM, [3] SP-SM	Too sandy.
	---	PT	Excess humus.
	---	All other	Excess fines.
3. Layer thickness (inches)	>36	<36	Thin layer.
4. Fraction greater than 3 inches (percent by weight) [4]	<50	>50	Large stones.

[1] Evaluate the thickest layer between 10 and 60 inches and also the bottom layer. Choose the best rating. When rating is based on the bottom layer, verify thickness.

[2] 100 minus percent passing No. 4 sieve is greater than 25.

[3] 100 minus percent passing No. 4 sieve is less than 25.

[4] Thickest layer between 10 and 60 inches.

Topsoil

Property	Limits			Restrictive feature
	Good	Fair	Poor	
1. USDA texture	---	---	Ice	Permafrost.
2. Depth to bedrock (inches)	>40	20-40	<20	Depth to rock.
3. Depth to cemented pan (inches)	>40	20-40	<20	Cemented pan.
4. Depth to bulk density greater than 1.8 g/cc (inches)	>40	20-40	<20	Area reclaim.
5. USDA texture [1]	---	LCOS, LS, LFS, LVFS	COS, S, FS, VFS	Too sandy.
6. USDA texture [1]	---	[2] SCL, [2] CL, [2] SICL	SIC, C, SC	Too clayey
7. USDA texture [1]	---	---	FB, HM, SP, MPT, MUCK, PEAT, CE	Excess humus.
8. Fraction greater than 3 inches (percent by weight): [3]				
0 to 40 inches	<5	5-25	>25	Large stones.
40 to 60 inches	<15	15-30	>30	Area reclaim.
9. Coarse fragments (percent): [3]				
0 to 40 inches	<5	5-25	>25	Small stones.
40 to 60 inches	<25	25-50	>50	Area reclaim.
10. Salinity (mmhos/cm) [1]	<4	4-8	>8	Excess salt.
11. Layer thickness (inches)	>40	20-40	<20	Thin layer.
12. Depth to high water table (feet)	---	---	<1	Wetness.
13. Sodium adsorption ratio in the upper 40 inches or great group or phase	---	---	>12 (halic, natric, alkali phases)	Excess sodium.
14. Soil reaction (pH) [1]	---	---	<3.6	Too acid.
15. Slope (percent)	<8	8-15	>15	Slope.
16. Carbonates	---	---	(4)	Excess lime.

[1] Thickest layer between 0 and 40 inches.
[2] If the soil has more than 3 percent organic matter and less than 35 percent clay, rate *good.*
[3] 100 minus percent passing No. 10 sieve, plus fraction greater than 3 inches. Use dominant condition or restrictive feature.
[4] If the amount of carbonate is so high that plant growth is restricted, rate *poor—excess lime.*

Pond Reservoir Areas

Property	Limits			Restrictive feature
	Slight	Moderate	Severe	
1. USDA texture	---	---	Ice	Permafrost.
2. Permeability between 20 and 60 inches (in/hr)	<0.6	0.6-2.0	>2.0	Seepage.
3. Depth to bedrock (inches)	>60	20-60	<20	Depth to rock.
4. Depth to cemented pan (inches)	>60	20-60	<20	Cemented pan.
5. Slope (percent)	<3	3-8	>8	Slope.
6. USDA texture (all depths)	---	---	MARL, GYP	Seepage.
7. Downslope movement	---	---	(1)	Slippage.
8. Formation of pits	---	---	(2)	Pitting.

[1] If the soil is susceptible to movement downslope when loaded, excavated, or wet, rate *severe—slippage*.

[2] If the soil is susceptible to the formation of pits caused by the melting of ground ice when the ground cover is removed, rate *severe—pitting*.

Embankments, Dikes, and Levees

Property	Limits			Restrictive feature
	Slight	Moderate	Severe	
1. USDA texture	---	---	Ice	Permafrost.
2. Layer thickness (inches)	>60	30-60	>30	Thin layer.
3. Unified [1]	---	---	GW, GP, SW, SP, GW-GM, GP-GM, SW-SM, SP-SM, [2] SM, [2] GM	Seepage.
4. Unified [1]	---	[3] GM, [4] CL	[5] ML, [6] SM, [6] SP, CL-ML	Piping.
5. Unified [1]	---	---	PT, OL, OH	Excess humus.
6. Unified [1]	---	---	MH, [7] CH	Hard to pack.
7. Fraction greater than 3 inches (percent by weight) [8]	<15	15-35	>35	Large stones.
8. Depth to high water table (feet)	---	---	+	Ponding.
Apparent	>4	2-4	<2	Wetness.
Perched	>3	1-3	<1	Wetness.
9. Sodium adsorption ratio in the upper 40 inches or great group or phase	---	---	>12 (natric, halic, alkali phases)	Excess sodium.
10. Salinity at any depth (mmhos/cm)	<8	8-16	>16	Excess salt.
11. Content of gypsum (percent)	---	5-10	>10	Excess gypsum.

[1] Thickest layer between 10 and 60 inches.

[2] Rate *moderate* if more than 20 percent passing No. 200 sieve and *slight* if more than 30 percent passing No. 200 sieve.

[3] Rate *slight* if less than 35 percent passing No. 200 sieve, less than 50 percent passing No. 40 sieve, and less than 65 percent passing No. 10 sieve. The soil must meet all three criteria before it is rated *slight*.

[4] Rate *slight* if PI is greater than 15.

[5] Rate *moderate* if PI is greater than 10.

[6] Rate *moderate* if less than 70 percent passing No. 40 sieve and less than 90 percent passing No. 10 sieve, and rate *slight* if less than 60 percent passing No. 40 sieve and less than 75 percent passing No. 10 sieve.

[7] Rate *moderate* if PI is less than 40.

[8] Weighted average to 40 inches.

Drainage

Property	Limits	Restrictive feature [1]
1. USDA texture	Ice	Permafrost.
2. Depth to high water table (feet) [2]	[3] >3 +	Deep to water. Ponding.
3. Permeability in the upper 40 inches (in/hr)	<0.2	Percs slowly.
4. Depth to bedrock (inches)	<40	Depth to rock.
5. Depth to cemented pan (inches)	<40	Cemented pan.
6. Flooding	Common	Flooding.
7. Total subsidence	Any entry	Subsides.
8. Fraction greater than 3 inches (percent by weight) [4]	>25	Large stones.
9. Potential for frost action	High	Frost action.
10. Slope (percent)	>3	Slope.
11. USDA texture [4]	COS, S, FS, VFS, LCOS, LS, LFS, LVFS, SG, G	Cutbanks cave.
12. Salinity at any depth (mmhos/cm)	>8	Excess salt.
13. Sodium adsorption ratio in the upper 40 inches or great group or phase	>12 (natric, halic, alkali phases)	Excess sodium.
14. Sulfidic materials (great group)	Sulfaquents, Sulfihemists	Excess sulfur.
15. Soil reaction (pH) at any depth	<3.6	Too acid.
16. Downslope movement	(5)	Slippage.
17. Complex landscape	(6)	Complex slope.
18. Availability of outlets	(7)	Poor outlets.

[1] If the soil has no restrictive features, the rating is *favorable*.
[2] If the soil is deep to water, disregard other properties.
[3] For irrigated areas, consider other restrictive features if the water table is between 3 and 5 feet.
[4] Thickest layer between 10 and 60 inches.
[5] If the soil is susceptible to movement downslope when loaded, excavated, or wet, list *slippage* as a restrictive feature.
[6] If complex or irregular slopes cause difficulty in design, installation, or functioning of the system, list *complex slope* as a restrictive feature.
[7] If good outlets are difficult to find, list *poor outlets* as a restrictive feature.

Irrigation

Property	Limits	Restrictive feature [1]
1. USDA texture	Ice	Permafrost.
2. Slope (percent)	>3	Slope.
3. Fraction greater than 3 inches (percent by weight) [2]	>25	Large stones.
4. Depth to high water table (feet)	+	Ponding.
	[3] <3	Wetness.
5. Available water capacity (in/in) [2]	<0.10	Droughty.
6. USDA texture (surface layer)	COS, S, FS, VFS, LCOS, LS, LFS, LVFS	Fast intake.
7. USDA texture (surface layer)	SIC, C, SC	Slow intake.
8. Wind erodibility group	1, 2, 3	Soil blowing.
9. Permeability in the upper 60 inches (in/hr)	<0.2	Percs slowly.
10. Depth to bedrock (inches)	<40	Depth to rock.
11. Depth to cemented pan (inches)	<40	Cemented pan.
12. Fragipan (great group)	All Fragi	Rooting depth.
13. Bulk density in the upper 40 inches (g/cc)	>1.7	Rooting depth.
14. Erosion factor K (surface layer)	>.35	Erodes easily.
15. Flooding	Common	Flooding.
16. Sodium adsorption ratio in the upper 40 inches or great group or phase	>12 (natric, halic, alkali phases)	Excess sodium.
17. Salinity in the upper 40 inches (mmhos/cm)	>4	Excess salt.
18. Soil reaction (pH) at any depth	<3.6	Too acid.
19. Complex landscape	(4)	Complex slope.
20. Formation of pits	(5)	Pitting.
21. Carbonates	(6)	Excess lime.

[1] If the soil has no restrictive features, the rating is *favorable*.

[2] Weighted average to 40 inches.

[3] If depth to the water table is more than 3 feet during the growing season, disregard wetness.

[4] If complex or irregular slopes cause difficulty in design, installation, or functioning of the system, list *complex slope* as a restrictive feature.

[5] If the soil is susceptible to the formation of pits caused by the melting of ground ice when the ground cover is removed, list *pitting* as a restrictive feature.

[6] If the amount of carbonate is so high that plant growth is restricted, list *excess lime* as a restrictive feature.

Terraces and Diversions

Property	Limits	Restrictive feature [1]
1. USDA texture	Ice	Permafrost.
2. Slope (percent)	>8	Slope.
3. Fraction greater than 3 inches (percent by weight) [2]	>25	Large stones.
4. Depth to bedrock (inches)	<40	Depth to rock.
5. Depth to cemented pan (inches)	<40	Cemented pan.
6. Erosion factor K in the upper 40 inches	>.35	Erodes easily.
7. Depth to high water table (feet)	+ <3	Ponding. Wetness.
8. Fragipan (great group)	All Fragi	Rooting depth.
9. USDA texture [3]	COS, S, FS, LS, LCOS, SG	Too sandy.
10. Wind erodibility group	1, 2, 3	Soil blowing.
11. Permeability (in/hr) [3]	<0.2	Percs slowly.
12. Downslope movement	(4)	Slippage.
13. Complex landscape	(5)	Complex slope.
14. Availability of outlets	(6)	Poor outlets.
15. Content of gypsum (percent)	>5	Excess gypsum.

[1] If the soil has no restrictive features, the rating is *favorable*.
[2] Weighted average to 40 inches.
[3] Thickest layer between 10 and 60 inches.
[4] If the soil is susceptible to movement downslope when loaded, excavated, or wet, list *slippage* as a restrictive feature.
[5] If complex or irregular slopes cause difficulty in design, installation, or functioning of the system, list *complex slope* as a restrictive feature.
[6] If good outlets are difficult to find, list *poor outlets* as a restrictive feature.

Grassed Waterways

Property	Limits	Restrictive feature [1]
1. USDA texture	Ice	Permafrost.
2. Moisture regime	Aridic, Torric	Too arid.
3. Fraction greater than 3 inches (percent by weight) [2]	>15	Large stones.
4. Depth to high water table (feet)	<1.5	Wetness.
5. Slope (percent)	>8	Slope.
6. Salinity in the surface layer (mmhos/cm)	>4	Excess salt.
7. Sodium adsorption ratio in the upper 40 inches or great group or phase	>12 (natric, halic, alkali phases)	Excess sodium.
8. Erosion factor K in the upper 40 inches	>.35	Erodes easily.
9. Available water capacity (in/in) [2]	<0.10	Droughty.
10. Depth to bedrock (inches)	<40	Depth to rock.
11. Depth to cemented pan (inches)	<40	Cemented pan.
12. Fragipan (great group)	All Fragi	Rooting depth.
13. Bulk density in the upper 40 inches (g/cc)	>1.7	Rooting depth.
14. Permeability in the upper 40 inches (in/hr)	<0.2	Percs slowly.

[1] If the soil has no restrictive features, the rating is *favorable*.
[2] Weighted average to 40 inches.

Appendix D.—Erosion Hazard Ratings

Erosion hazard, or the susceptibility of soil to erosion, is the potential inherent in the soil itself to erode if the forces that cause erosion are applied to an area that is not adequately protected.

The erosion hazard ratings given in this survey indicate the possibility of future accelerated erosion by water and refer to sheet and rill erosion only. The hazard of water erosion by other processes, such as gully erosion or mass movement, is not included.

This method of rating differs from the method specified in the California Forest Practice Act (FPA) rules. However, information provided here (soil texture, coarse fragments, permeability, and depth) could be used to develop ratings using the FPA method. Because the soil properties described in this survey apply to the central concept of the named soil and some local variation is expected, the information should be confirmed through onsite investigation when erosion hazard ratings are developed for timber harvest plans required under the Forest Practice Act.

The ratings are intended to be used as a guide; they are not absolute. They are provided to assist land managers in planning and evaluating management practices. A high rating, for example, would alert the user to the likelihood that water erosion is a concern in areas of that soil under certain site and management conditions. The user should carefully consider the erodibility of the soil when management options are evaluated, and further onsite investigation might be necessary before decisions are finalized.

Ratings are given in the map unit descriptions (under the heading “Detailed Soil Map Units”). The ratings were determined using a method developed by the California Soil Survey Committee. Criteria used include (a) bare soil conditions; (b) the central concept of the properties of the named soil (texture, aggregate stability, infiltration rate, permeability, and depth) as it occurs within the map unit throughout the survey area; (c) climatic characteristics for the survey area; (d) the slope range for the map unit; and (e) a slope length of 50 feet. If necessary, a given rating could be adjusted by the user to actual onsite conditions for cover and slope using the same rating method. The headquarters of the Soil-Vegetation Survey can provide more detailed information regarding rating criteria.

An estimate of the organic soil cover necessary to reduce the erosion hazard is also given in the map unit descriptions. The term “organic soil cover” as used in this survey includes duff, slash, grasses, low-growing shrubs, or any organic crop residue.

The adjective ratings given in this survey indicate the degree of limitation resulting from the hazard of sheet and rill erosion. They are defined as follows:

Low.—Accelerated erosion is not likely to occur following disturbance, except in the upper part of the low erosion hazard rating numerical range or during periods of above-average storm occurrence. If accelerated erosion does occur, adverse effects on soil productivity and on the quality of water nearby are not expected. Erosion-control measures are generally not needed.

Moderate.—Accelerated erosion is likely to occur following disturbance in most years. The effects on soil productivity (especially in areas of shallow or moderately deep soils) and on the quality of water nearby may be adverse in the upper part of the moderate erosion hazard rating numerical range or during periods of above-average storm occurrence. The need for erosion control should be evaluated in these areas. A wide selection of measures and application methods is available.

High.—Accelerated erosion will occur following disturbance in most years. Adverse effects on soil productivity (especially in areas of shallow or moderately deep soils) and to the quality of water nearby are likely, especially during periods of above-average storm occurrence. Erosion control is necessary in these areas to prevent accelerated erosion. The selection of measures and methods of application is somewhat limited.

Very high.—Accelerated erosion will occur following disturbance in most years. Adverse effects on soil productivity and on the quality of water nearby are very likely, even during periods of below-average storm occurrence. Erosion control is essential in these areas. The selection of measures and methods of application is limited.

Appendix E.—Criteria Used in Rating Soils for Woodland Management

Criteria for Rating Equipment Limitations [1]

Rating	Percent slope	Drainage class (wetness)	Stoniness class (surface)	Rockiness class (surface)	Texture
Slight	0 to 30	Excessive, somewhat excessive, well	None (0 to 3 percent)	None (0 to 2 percent)	Coarse textured soils—loamy sands, sands, sandy loams
			Stony (3 to 15 percent)	Rocky (2 to 10 percent)	Medium textured soils—very fine sandy loam, loam, silt loam, silt
Moderate	30 to 50 [2]	Moderately well, somewhat poor	Very stony (15 to 50 percent)	Very rocky (10 to 25 percent)	Moderately fine textured soils—clay loam, sandy clay loam, silty clay loam
Severe	50+	Poor, very poor	Extremely stony (50 to 90 percent) Rubble land (90+ percent)	Extremely rocky (25 to 50 percent) Rock outcrop (50 to 90 percent) Rubble land (90+ percent)	Fine textured soils—sandy clay loam, silty clay, clay

[1] Use the most limiting factor when ratings are made. Ratings are made for the principal timber-harvesting equipment, including logging trucks, bulldozers, and rubber-tired skidders. When the rating is severe, other timber-harvesting methods, including cable yarding systems and helicopters, should be given serious consideration or the logging should be postponed. The major factors influencing the ratings are slope, drainage, stoniness, rockiness, and content of clay. A combination of any two moderate ratings could classify as a severe overall rating.

Stone content (surface layer)

NSH	Class	Percent	Cropland	Range	Woodland
1	0	0 to .01	None	None	None
2	1	.01 to 0.1	Stony	None	None
3	2	0.1 to 3	Stony	None	None
4	3	3 to 15	Very stony	Stony	Stony
5	4	15 to 50	Extremely stony	Very stony	Very stony
6	5	50 to 90	Extremely stony	Extremely stony	Extremely stony
7	6	>90 (Rubble land)			

[2] Rate severe if a pickup is used in harvesting firewood.

Key for Rating Soils for Reforestation (Seedling Mortality)

This key was used to rate the soils of the survey area for seedling mortality. The adjectives used in the ratings are:

a) Slight
b) Moderate
c) Severe

The general meanings are as defined in the SCS Woodland Manual Sec. 537.11-2. The species rated in this key are redwood, Douglas-fir, ponderosa pine, and white fir. Other species can be added. Chemical toxicities, imbalances, pH problems, and other problems, such as serpentine, are not included. Any rating may be raised one or two classes for these problems, depending on their severity. Observations in a soil survey area may be used to modify the rating. Following is a flowchart that may be helpful in fitting other species or critical soil properties into the key.

1. Soil drainage class (if the soil is subject to flooding, use b):
   a) Very poor .... severe
   b) Poor or somewhat poor 2
   c) Moderately well or better 3

2. Species being rated:
   a) Douglas-fir, ponderosa pine, or true fir .... severe
   b) Redwood 3

3. Depth to water table, claypan, or other restrictive layer:
   a) Less than 12 inches .... severe
   b) More than 12 inches 4

4. Species being rated:
   a) Redwood 5
   b) Douglas-fir 13
   c) Ponderosa pine 18
   d) White fir 19

5. Moisture-temperature regime:
   a) Aquic .... severe
   b) Udic 6
   c) Ustic-isomesic 9
   d) Other than a, b, or c .... severe

6. Surface gravel:
   a) Very gravelly (more than 35 percent) 7
   b) Not very gravelly (0 to 35 percent) .... slight

7. Are surface coarse fragments sufficient to hinder reforestation (more than about 75 percent coarse fragments)?
   a) Yes .... severe
   b) No 8

8. Steepness of slope:
   a) Less than 75 percent .... slight
   b) More than 75 percent .... moderate

9. AWC of top 24 inches of profile:
   a) More than 3.5 inches 6
   b) 2.5 to 3.5 inches 10
   c) Less than 2.5 inches .... severe

10. Surface gravel:
    a) Very gravelly (more than 35 percent) 11
    b) Not very gravelly (0 to 35 percent) .... moderate

Key for Rating Soils for Reforestation (Seedling Mortality)—Continued

11. Are surface coarse fragments sufficient to hinder reforestation (more than about 75 percent coarse fragments)?
    - a) Yes .... severe
    - b) No 12

12. Steepness of slope:
    - a) Less than 75 percent .... moderate
    - b) More than 75 percent .... severe

13. Moisture-temperature regime:
    - a) Xeric-mesic 17
    - b) Ustic 14
    - c) Udic 6
    - d) Other than a, b, or c .... severe

14. Aspect (if direction of slope is not important, use a):
    - a) North or east—azimuth 270-135 degrees 15
    - b) South—azimuth 135-270 degrees 16

15. AWC of top 24 inches of profile:
    - a) More than 2.5 inches 6
    - b) 1.5 to 2.5 inches 10
    - c) Less than 1.5 inches .... severe

16. AWC of top 24 inches of profile:
    - a) More than 3.0 inches 6
    - b) 2.0 to 3.0 inches 10
    - c) Less than 2.0 inches .... severe

17. Aspect (if direction of slope is not important, use a):
    - a) North or east—azimuth 270-135 degrees 16
    - b) South—azimuth 135-270 degrees 9

18. Moisture-temperature regime:
    - a) Xeric-mesic 14
    - b) Xeric-frigid 20

19. Annual precipitation:
    - a) Less than 20 inches .... severe
    - b) More than 20 inches 18b

20. Aspect (if direction of slope is not important, use b):
    - a) North 15
    - b) South 21

21. AWC of top 24 inches of profile:
    - a) More than 2.0 inches 6
    - b) 1.5 to 2.0 inches 10
    - c) Less than 1.5 inches .... severe

Criteria for Rating Plant Competition [1]

Rating	Drainage	Depth	Site class	Total AWC
Slight	Excessive	Less than 10 inches	5, 6	Less than 4 inches
Moderate	Somewhat excessive	10 to 20 inches	3, 4	4 to 7 inches
Severe	Well, moderately well, somewhat poor, poor, very poor	More than 20 inches	1, 2	More than 7 inches

[1] Plant competition refers to the effect of other plants (all kinds) on the growth and survival of desirable tree species—both conifers and broad-leaved trees. In most cases the desirable trees will be conifers. Plant competition is related to soil fertility, depth, available water capacity, and drainage. On wet soils competition from phreatic plants will be severe. On droughty soils plant competition will be minimal. On frigid soils the available water capacity may be one class lower. On oak woodland the rating should be severe because of grass competition.

Criteria for Rating Susceptibility to Burning Damage (Prescribed Burning and Wildfire) [1]

Soil property	Rating guide	Rating guide	Rating guide	Rating assigned
Content of organic matter in the top 4 inches	>1 percent Rating=1	<1 percent Rating=2	---	#___
Content of coarse fragments in the top 4 inches	<35 percent Rating=1	35 to 65 percent Rating=2	>65 percent Rating=5	#___
Texture in the top 4 inches	SCL, CL, SICL, SC, SIC, C Rating=1	L, SIL, SI Rating=2	S, LS, SL Rating=3	#___
Slope (percent)	0 to 30 Rating=1	30 to 50 Rating=2	>50 Rating=3	#___
				Total=___

Total rating	*Susceptibility to burning damage* [2]
4 to 6	Slight
7 to 9	Moderate
10 to 13	Severe

[1] Soil damage can sometimes occur from burning. The risk of damage increases with the intensity of heat. The damage is mainly related to the loss of organic matter. Some soils have characteristics that enable them to withstand this loss better than other soils. These characteristics are used to rate the soils for their susceptibility to damage from burning, as expressed in the table. The rating system is intended to be used as a general guideline. Other factors not mentioned may alter the rating.

[2] Rate soils predominantly on southeast to west aspects (135 to 270 degrees azimuth) one category higher.

Criteria for Rating Soil Compaction Hazard [1]

USDA texture in the top 10 inches	Ochric epipedon		Mollic or umbric epipedon
	Weak or platy structure [2]	Moderate or strong structure	
Volume of coarse fragments >65 percent, all textures, and all ashy, ashy-skeletal, medial, medial-skeletal, and cindery material	Slight	Slight	Slight
Volume of coarse fragments 35 to 65 percent, all very gravelly textures (skeletal soils)	Moderate	Slight	Slight
Volume of coarse fragments < 35 percent:			
S, LS	Slight	Slight	Slight
SCL, SC, FS, LFS, FSL, SL	Severe	Moderate	Moderate
L, SIL, SICL	Severe	Moderate	Slight
C, SIC	Moderate	Slight	Slight

[1] A rating of severe indicates that the soil is easily compacted and compaction is not easily mitigated, moderate indicates that the soil is compacted with moderate effort and compaction is easily mitigated, and slight indicates that considerable effort is needed to compact the soil.

[2] Very coarse prismatic structure is regarded as weak, essentially massive.

Criteria for Rating Difficulty of Revegetating Exposed Subsoil

Subsoil horizons are frequently exposed during forest management activities. This exposure occurs on road cuts and fills and on some skid roads. Land managers may desire to revegetate these areas, and they may be required to do so by law or by regulations of an agency. Revegetation may be for erosion control or for timber production (as on old skid roads planted to trees). Separate ratings are given for revegetation with either grass or trees. The characteristics of the subsoil that influence planting conditions, germination, and the subsequent growth rate are considered in the ratings. These are general ratings; they do not preclude the need for onsite investigation of individual projects.

1. Soil moisture and/or temperature regime:
   Frigid=2; ustic=2; xeric-mesic=4; thermic=6; aquic or udic=0.
   Points: _____
2. General texture:
   Fine (SC, SIC, C)=5; moderately fine or coarser=0.
   Points: _____
3. Drainage class:
   Very poor=25; poor or somewhat poor=15; moderately well or better=0.
   Points: _____
4. Content of coarse fragments:
   0 to 35 percent=0; 35 to 65 percent=5; >65 percent=15.
   Points: _____
5. AWC of total soil profile:
   Very low (<3 inches)=10; low (3 to 6 inches)=5; moderate or higher (>6 inches)=0.
   Points: _____
6. Underlying rock or material:
   Hard bedrock with little fracturing=5; soft rock, unconsolidated material, or highly fractured rock=0.
   Points: _____
7. Original soil depth:
   >40 inches=0; 20 to 40 inches=4; 10 to 20 inches=8; <10 inches=10.
   Points: _____
8. Slope:
   0 to 30 percent=0; 30 to 50 percent=2; 50 to 75 percent=4; >75 percent=6.
   Points: _____
9. Nutrient deficiencies, imbalances, or toxicities:
   Increase rating according to the magnitude of the problem. Serpentinitic parent material is an example of the type of problem.

Add up points for each characteristic to obtain the rating—

For grass revegetation:	*Slight*	0 to 20 points
	Moderate	21 to 29 points
	Severe	30+ points
For tree revegetation:	*Slight*	0 to 13 points
	Moderate	14 to 22 points
	Severe	23+ points

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1951-84 at Adin, Hat Creek, and McCloud, California)

Month	Temperature: Average daily maximum	Temperature: Average daily minimum	Temperature: Average	Temperature: 2 years in 10 will have-- Maximum temperature higher than--	Temperature: 2 years in 10 will have-- Minimum temperature lower than--	Temperature: Average number of growing degree days*	Precipitation: Average	Precipitation: 2 years in 10 will have-- Less than--	Precipitation: 2 years in 10 will have-- More than--	Precipitation: Average number of days with 0.10 inch or more	Precipitation: Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
ADIN:											
January----	42.4	18.9	30.7	60	0	26	2.26	0.76	3.53	6	11.9
February---	47.6	24.0	35.8	64	2	62	1.76	.80	2.56	5	6.4
March------	52.1	25.7	38.9	70	7	76	1.56	.70	2.24	5	7.8
April------	58.1	28.5	43.3	80	12	186	1.25	.46	1.90	4	3.7
May--------	69.0	35.8	52.4	88	19	389	1.35	.48	2.03	4	.8
June-------	77.5	42.3	59.9	95	27	597	1.03	.19	1.72	3	.1
July-------	86.6	47.2	66.9	100	33	834	.27	.00	.50	1	.0
August-----	85.3	45.7	65.5	99	32	791	.47	.00	.83	1	.0
September--	79.3	39.7	59.5	95	23	585	.64	.07	1.01	2	.1
October----	67.0	33.0	50.0	88	16	330	1.45	.20	2.34	3	.7
November---	53.1	26.6	39.9	72	7	79	1.95	.71	2.94	5	4.0
December---	44.7	20.8	32.8	61	7	62	2.26	.86	3.44	7	11.0
Yearly:											
Average---	63.6	32.4	48.0	---	---	---	---	---	---	---	---
Extreme---	---	---	---	101	7	---	---	---	---	---	---
Total-----	---	---	---	---	---	4,017	16.25	12.76	19.40	46	46.5
HAT CREEK:											
January----	46.2	21.8	34.0	62	0	37	3.12	1.21	4.72	8	10.0
February---	51.8	25.2	38.5	68	8	62	2.58	.96	3.92	7	3.7
March------	56.2	27.8	42.0	75	14	117	2.30	.93	3.45	6	3.6
April------	63.4	31.6	47.5	85	20	248	1.26	.45	1.93	4	1.3
May--------	73.2	37.8	55.5	95	25	481	1.15	.28	1.82	3	.1
June-------	81.8	43.3	62.6	101	30	678	.85	.14	1.39	3	.0
July-------	90.6	46.2	68.4	103	35	880	.20	.00	.29	1	.0
August-----	89.1	44.0	66.6	104	34	825	.40	.00	.69	1	.0
September--	83.2	38.6	60.9	99	26	627	.58	.07	.96	2	.1
October----	70.9	32.1	51.5	91	19	357	1.34	.16	2.24	3	.0
November---	55.5	27.3	41.4	76	12	88	2.44	.98	3.70	6	1.6
December---	46.9	22.9	34.9	61	3	45	3.24	1.18	4.94	8	7.4
Yearly:											
Average---	67.4	33.2	50.3	---	---	---	---	---	---	---	---
Extreme---	---	---	---	105	3	---	---	---	---	---	---
Total-----	---	---	---	---	---	4,445	19.46	15.28	23.27	52	27.8

See footnote at end of table.

Table 1.--Temperature and Precipitation--Continued

Month	Temperature: Average daily maximum	Temperature: Average daily minimum	Temperature: Average	Temperature: 2 years in 10 will have-- Maximum temperature higher than--	Temperature: 2 years in 10 will have-- Minimum temperature lower than--	Temperature: Average number of growing degree days*	Precipitation: Average	Precipitation: 2 years in 10 will have-- Less than--	Precipitation: 2 years in 10 will have-- More than--	Precipitation: Average number of days with 0.10 inch or more	Precipitation: Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
McCLOUD:											
January----	45.5	23.2	34.4	65	2	32	9.93	3.71	15.12	11	31.0
February---	49.0	25.9	37.5	68	9	51	8.07	2.56	12.55	9	15.8
March------	52.3	27.3	39.8	74	14	85	6.62	2.35	10.15	9	14.3
April------	59.7	30.5	45.1	83	18	199	3.76	1.06	5.93	6	6.1
May--------	69.9	36.6	53.3	92	23	412	1.96	.32	3.20	4	.4
June-------	78.5	43.1	60.8	98	29	624	.95	.13	1.57	3	.0
July-------	87.4	46.8	67.1	101	35	840	.26	.00	.43	1	.1
August-----	85.9	45.1	65.5	101	34	791	.54	.00	.96	1	.0
September--	80.3	40.0	60.2	98	28	606	1.07	.06	1.79	2	.0
October----	68.3	33.8	51.1	89	21	350	3.18	.77	5.12	5	.1
November---	53.6	28.6	41.1	76	15	103	7.85	1.92	12.54	9	7.4
December---	46.9	24.9	35.9	65	8	47	8.89	3.00	13.73	10	21.5
Yearly:											
Average---	64.8	33.8	49.3	---	---	---	---	---	---	---	---
Extreme---	---	---	---	102	2	---	---	---	---	---	---
Total-----	---	---	---	---	---	4,140	53.08	41.11	64.29	70	96.7

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1951-84 at Adin, Hat Creek, and McCloud, California)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
ADIN:			
Last freezing temperature in spring:			
1 year in 10 later than--	May 25	June 8	July 3
2 years in 10 later than--	May 17	June 1	June 26
5 years in 10 later than--	May 2	May 18	June 12
First freezing temperature in fall:			
1 year in 10 earlier than--	Aug. 30	July 30	July 4
2 years in 10 earlier than--	Sept. 16	Aug. 19	July 27
5 years in 10 earlier than--	Oct. 19	Sept. 27	Sept. 8
HAT CREEK:			
Last freezing temperature in spring:			
1 year in 10 later than--	May 4	May 26	June 22
2 years in 10 later than--	Apr. 28	May 22	June 16
5 years in 10 later than--	Apr. 18	May 12	June 3
First freezing temperature in fall:			
1 year in 10 earlier than--	Sept. 26	Sept. 16	Aug. 14
2 years in 10 earlier than--	Oct. 3	Sept. 22	Aug. 24
5 years in 10 earlier than--	Oct. 16	Oct. 2	Sept. 12

Table 2.--Freeze Dates in Spring and Fall--Continued

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
McCLOUD:			
Last freezing temperature in spring:			
1 year in 10 later than--	May 24	June 8	June 30
2 years in 10 later than--	May 17	June 1	June 24
5 years in 10 later than--	May 2	May 19	June 11
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 3	Sept. 10	Aug. 4
2 years in 10 earlier than--	Oct. 10	Sept. 18	Aug. 15
5 years in 10 earlier than--	Oct. 24	Oct. 3	Sept. 7

Table 3.--Growing Season

(Recorded in the period 1951-84 at Adin, Hat Creek, and McCloud, California)

Probability	Daily minimum temperature during growing season: Higher than 24 ^{o}F	Higher than 28 ^{o}F	Higher than 32 ^{o}F
	Days	Days	Days
ADIN:			
9 years in 10	129	82	39
8 years in 10	141	97	53
5 years in 10	164	125	81
2 years in 10	187	155	109
1 year in 10	201	173	126
HAT CREEK:			
9 years in 10	153	120	67
8 years in 10	162	127	79
5 years in 10	180	142	100
2 years in 10	198	156	121
1 year in 10	207	164	133
McCLOUD:			
9 years in 10	143	107	46
8 years in 10	153	117	60
5 years in 10	173	136	87
2 years in 10	193	156	113
1 year in 10	204	166	127

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Lassen County	Modoc County	Shasta County	Siskiyou County	Total-- Area	Total-- Extent
		Acres	Acres	Acres	Acres	Acres	Pct
101	Adinot very gravelly sandy loam, 2 to 15 percent slopes	803	0	0	0	803	*
102	Adinot very cobbly sandy loam, 2 to 15 percent slopes	1,350	2,273	0	0	3,623	0.3
103	Adinot very cobbly sandy loam, 15 to 30 percent slopes	2,437	3,855	0	0	6,292	0.6
104	Adinot very stony sandy loam, 2 to 15 percent slopes	1,067	1,641	0	0	2,708	0.2
105	Adinot-Adinot, eroded, complex, 2 to 15 percent slopes	4,922	899	0	0	5,821	0.5
106	Badenaugh-Matquaw association, 2 to 15 percent slopes	750	0	0	0	750	*
107	Bieber-Esperanza complex, 0 to 2 percent slopes	398	300	1,555	0	2,253	0.2
108	Bieber-Modoc complex, 0 to 5 percent slopes	10,957	3,814	0	0	14,771	1.3
109	Blankout-Medici complex, 2 to 15 percent slopes	0	2,687	0	905	3,592	0.3
110	Boardburn-Hambone complex, 5 to 15 percent slopes	1,795	338	2,230	691	5,054	0.4
111	Bollibokka loam, 2 to 15 percent slopes	0	0	3,282	0	3,282	0.3
112	Bollibokka loam, 30 to 50 percent slopes	0	0	1,325	20	1,345	0.1
113	Bollibokka loam, 50 to 75 percent slopes	0	0	1,055	0	1,055	*
114	Britton silty clay loam, 5 to 15 percent slopes	0	0	600	0	600	*
115	Britton silty clay loam, 15 to 30 percent slopes	0	0	1,280	0	1,280	0.1
116	Britton silty clay loam, 30 to 50 percent slopes	0	0	685	0	685	*
117	Bundora-Goulder complex, 2 to 15 percent slopes	0	0	1,300	2,734	4,034	0.4
118	Bundora-Goulder complex, 15 to 30 percent slopes	0	0	0	1,861	1,861	0.2
119	Bundora-Goulder complex, 30 to 50 percent slopes	0	0	6,649	0	6,649	0.6
120	Bunselmeier very gravelly sandy loam, 15 to 30 percent slopes	750	5	620	0	1,375	0.1
121	Burman-Lasvar complex, 0 to 2 percent slopes	0	3,102	305	0	3,407	0.3
122	Burney-Arkright complex, 2 to 9 percent slopes	0	75	12,040	3,310	15,425	1.4
123	Canyoncreek-Hermit complex, 15 to 30 percent slopes	0	8,023	0	0	8,023	0.7
124	Canyoncreek-Hermit complex, 30 to 50 percent slopes	0	1,231	0	0	1,231	0.1
125	Carberry gravelly fine sandy loam, 2 to 15 percent slopes	0	0	9,450	0	9,450	0.8
126	Carberry gravelly fine sandy loam, 15 to 30 percent slopes	0	0	3,940	30	3,970	0.3
127	Carberry gravelly fine sandy loam, 30 to 50 percent slopes	0	0	480	0	480	*
128	Carberry, warm-Ponto complex, 2 to 15 percent slopes	0	0	4,010	0	4,010	0.4
129	Carberry, warm-Ponto complex, 15 to 30 percent slopes	0	0	3,145	0	3,145	0.3
130	Carberry, warm-Lava flows complex, 15 to 30 percent slopes	0	0	735	0	735	*
131	Chalkford loam, 0 to 2 percent slopes	0	2,410	0	0	2,410	0.2
132	Chatterdown-Nikal complex, 2 to 15 percent slopes	0	0	245	0	245	*
133	Chirpchatter-Hunsinger complex, 2 to 15 percent slopes	2,480	6,968	6,639	3,553	19,640	1.7
134	Coneward loamy sand, 2 to 15 percent slopes	0	30	1,022	0	1,052	*
135	Coneward loamy sand, 15 to 30 percent slopes	0	0	450	0	450	*
136	Coneward loamy sand, 30 to 50 percent slopes	0	0	325	0	325	*
137	Coneward-Lava flows complex, 2 to 15 percent slopes	0	0	1,261	0	1,261	0.1
138	Cupvar silty clay, 0 to 2 percent slopes	2,931	923	2,471	0	6,325	0.6
139	Danhunt gravelly sandy loam, 15 to 30 percent slopes	0	0	665	0	665	*
140	Danhunt gravelly sandy loam, 30 to 50 percent slopes	0	0	1,795	0	1,795	0.2

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Lassen County	Modoc County	Shasta County	Siskiyou County	Total-- Area	Extent
		Acres	Acres	Acres	Acres	Acres	Pct
141	Danhunt gravelly sandy loam, 50 to 75 percent slopes	0	0	750	0	750	*
142	Daphnedale loam, 9 to 15 percent slopes	104	655	0	0	759	*
143	Datom clay loam, 2 to 9 percent slopes	2,164	415	0	0	2,579	0.2
144	Dekkas fine sandy loam, 0 to 5 percent slopes	0	0	1,735	0	1,735	0.2
145	Depner gravelly sandy loam, 15 to 30 percent slopes	0	0	2,590	0	2,590	0.2
146	Depner gravelly sandy loam, 30 to 50 percent slopes	0	0	1,370	0	1,370	0.1
147	Deven very cobbly loam, 2 to 15 percent slopes	290	2,171	42	0	2,503	0.2
148	Deven very cobbly loam, 15 to 30 percent slopes	0	2,465	0	0	2,465	0.2
149	Deven very cobbly loam, 30 to 50 percent slopes	0	1,202	0	0	1,202	0.1
150	Dosa-Burman complex, 0 to 2 percent slopes	600	0	71	0	671	*
151	Dotta loam, gravelly substratum, 0 to 2 percent slopes	415	550	0	0	965	*
152	Dotta sandy loam, 2 to 5 percent slopes	1,316	1,656	775	0	3,747	0.3
153	Dotta sandy loam, 5 to 9 percent slopes	496	195	0	0	691	*
154	Dotta sandy loam, 9 to 15 percent slopes	408	0	0	0	408	*
155	Dotta sandy loam, 15 to 30 percent slopes	429	41	0	0	470	*
156	Dotta-Esperanza complex, moist, 0 to 5 percent slopes	0	0	515	0	515	*
157	Dotta-Ricketts complex, 15 to 30 percent slopes	1,457	1,214	0	0	2,671	0.2
158	Dotta-Searvar complex, 2 to 15 percent slopes	3,230	0	321	0	3,551	0.3
159	Dudgen-Graven complex, 0 to 5 percent slopes	632	1,250	1,030	0	2,912	0.3
160	Dudgen-Graven complex, flooded, 0 to 5 percent slopes	77	0	10,693	0	10,770	0.9
161	Esperanza sandy loam, 2 to 5 percent slopes	423	485	482	0	1,390	0.1
162	Esperanza loam, 0 to 2 percent slopes	2,908	0	1,907	0	4,815	0.4
163	Esro silt loam, gravelly substratum, 0 to 2 percent slopes	0	422	1,222	0	1,644	0.1
164	Etsel-Neuns complex, 50 to 75 percent slopes	0	0	6,044	210	6,254	0.6
165	Fiddler-Deven complex, 15 to 30 percent slopes	130	2,094	0	0	2,224	0.2
166	Fiddler-Deven complex, 30 to 50 percent slopes	0	360	0	0	360	*
167	Fiddler-Whitinger complex, 5 to 15 percent slopes	2,400	2,395	170	0	4,965	0.4
168	Fiddler-Whitinger complex, 15 to 30 percent slopes	155	1,155	0	0	1,310	0.1
169	Gardens-Jacksback complex, 0 to 2 percent slopes	0	0	1,254	0	1,254	0.1
170	Gasper-Scarface complex, 15 to 30 percent slopes	0	5,810	3,740	3,682	13,232	1.2
171	Gasper-Scarface complex, 30 to 50 percent slopes	0	3,248	2,385	2,131	7,764	0.7
172	Gasper-Scarface complex, moist, 2 to 15 percent slopes	0	0	7,965	0	7,965	0.7
173	Gasper-Scarface complex, moist, 15 to 30 percent slopes	0	0	7,050	0	7,050	0.6
174	Gasper-Scarface complex, moist, 30 to 50 percent slopes	0	0	7,180	0	7,180	0.6
175	Gooval cobbly loam, 2 to 9 percent slopes	0	0	2,225	0	2,225	0.2
176	Gosch very stony sandy loam, 15 to 30 percent slopes	0	1,573	0	0	1,573	0.1
177	Gosch-Witcher complex, 30 to 50 percent slopes	0	5,809	0	0	5,809	0.5
178	Goulder gravelly sandy loam, 2 to 15 percent slopes	0	0	4,052	0	4,052	0.4
179	Goulder gravelly sandy loam, 15 to 30 percent slopes	0	0	4,885	0	4,885	0.4
180	Goulder gravelly sandy loam, 30 to 50 percent slopes	0	0	860	0	860	*
181	Gullied land-Rock outcrop-Mounthat complex, 50 to 75 percent slopes	0	0	1,509	0	1,509	0.1
182	Hambone-Boardburn complex, 15 to 30 percent slopes	550	1,441	3,020	841	5,852	0.5

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Lassen County	Modoc County	Shasta County	Siskiyou County	Total-- Area	Total-- Extent
		Acres	Acres	Acres	Acres	Acres	Pct
183	Hambone-Boardburn complex, 30 to 50 percent slopes	495	397	3,895	994	5,781	0.5
184	Henhill silt loam, partially drained, 0 to 2 percent slopes	2,378	220	1,920	0	4,518	0.4
185	Henhill silt loam, gravelly substratum, 0 to 2 percent slopes	712	714	210	0	1,636	0.1
186	Hermit-Canyoncreek complex, 2 to 15 percent slopes	0	7,463	0	0	7,463	0.7
187	Hunsinger-Chirpchatter complex, 2 to 15 percent slopes	10,058	404	0	0	10,462	0.9
188	Hunsinger-Chirpchatter complex, 15 to 30 percent slopes	5,217	5,920	780	0	11,917	1.0
189	Hunsinger-Chirpchatter complex, 30 to 50 percent slopes	1,146	12,841	2,890	0	16,877	1.5
190	Jacksback loam, 2 to 9 percent slopes	0	0	1,685	0	1,685	0.1
191	Jadpor gravelly sandy loam, 0 to 5 percent slopes	0	0	501	0	501	*
192	Jadpor very gravelly sandy loam, 0 to 5 percent slopes	0	0	1,095	0	1,095	0.1
193	Jahjo-Lava flows-Loveness complex, 2 to 15 percent slopes	0	6,272	0	70	6,342	0.6
194	Jellico-Lava flows complex, 5 to 15 percent slopes	0	0	6,706	0	6,706	0.6
195	Jellico-Splawn complex, 15 to 30 percent slopes	14,637	85	713	0	15,435	1.4
196	Jellico-Splawn complex, 30 to 50 percent slopes	6,235	0	3,890	0	10,125	0.9
197	Jellycamp extremely gravelly sandy loam, 2 to 5 percent slopes	2,250	85	0	0	2,335	0.2
198	Jellycamp-Karcal-Longcreek complex, 2 to 15 percent slopes	2,000	304	0	0	2,304	0.2
199	Jellycamp-Karcal-Longcreek complex, cool, 2 to 15 percent slopes	5,063	270	0	0	5,333	0.5
200	Jellycamp-Lassen-Longcreek complex, 2 to 15 percent slopes	12,601	9,783	0	0	22,384	2.0
201	Jellycamp-Ollierivas complex, 2 to 9 percent slopes	8,974	4,101	11,937	0	25,012	2.2
202	Jellycamp-Splawn-Ollierivas complex, 2 to 15 percent slopes	9,464	0	943	0	10,407	0.9
203	Jellycamp-Splawn-Ricketts complex, 2 to 30 percent slopes	1,519	1,847	325	181	3,872	0.3
204	Jellycamp-Vansickle complex, very cobbly loam, 2 to 9 percent slopes	17,451	442	10	0	17,903	1.6
205	Jellycamp-Vansickle complex, extremely stony loam, 2 to 9 percent slopes	1,640	0	0	0	1,640	0.1
206	Jellycamp-Vansickle complex, warm, 2 to 9 percent slopes	943	0	0	0	943	*
207	Jimmerson loam-Jimmerson stony sandy loam complex, 2 to 15 percent slopes	0	0	25,536	8,256	33,792	3.0
208	Jimmerson loam-Jimmerson stony sandy loam complex, 15 to 30 percent slopes	0	0	5,607	1,348	6,955	0.6
209	Jimmerson stony loam-Jimmerson loam complex, 30 to 50 percent slopes	0	0	4,173	1,875	6,048	0.5
210	Karcal-Cuppy complex, 2 to 15 percent slopes	3,277	110	0	0	3,387	0.3
211	Keddie muck, 0 to 1 percent slopes	0	0	830	0	830	*
212	Keddie loam, 0 to 2 percent slopes	0	0	525	0	525	*
213	Keddie silt loam, 0 to 2 percent slopes	0	0	660	0	660	*
214	Kephart-Quaking complex, 2 to 15 percent slopes	0	2,167	0	0	2,167	0.2
215	Kettlebelly gravelly loam, 5 to 15 percent slopes	0	0	465	0	465	*
216	Kettlebelly, dry-Neuns complex, 15 to 30 percent slopes	0	0	613	275	888	*
217	Kettlebelly, dry-Neuns complex, 30 to 50 percent slopes	0	0	1,215	1,621	2,836	0.2

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Lassen County Acres	Modoc County Acres	Shasta County Acres	Siskiyou County Acres	Total-- Area Acres	Total-- Extent Pct
218	Kettlebelly-Neuns complex, 15 to 30 percent slopes	0	0	483	0	483	*
219	Kettlebelly-Neuns complex, 30 to 50 percent slopes	0	0	1,247	0	1,247	0.1
220	Kilarc gravelly silt loam, 2 to 15 percent slopes	0	0	251	0	251	*
221	Kilarc gravelly silt loam, 15 to 30 percent slopes	0	0	340	0	340	*
222	Kilarc gravelly silt loam, 30 to 50 percent slopes	0	0	250	0	250	*
223	Kindig-Neuns complex, 15 to 30 percent slopes	0	0	1,214	1,495	2,709	0.2
224	Kindig-Neuns complex, 30 to 50 percent slopes	0	0	4,571	6,620	11,191	1.0
225	Lassen-Cuppy complex, 2 to 15 percent slopes	9,782	115	10	0	9,907	0.9
226	Lasvar clay, 0 to 2 percent slopes	0	233	900	0	1,133	*
227	Lasvar-Pitvar complex, 0 to 2 percent slopes	5	8,548	39	45	8,637	0.8
228	Lava flows	0	1,744	9,865	762	12,371	1.1
229	Lava flows-Gassaway complex, 2 to 15 percent slopes	0	8,592	25,644	3,202	37,438	3.3
230	Lava flows-Neer complex, 2 to 15 percent slopes	0	0	1,616	664	2,280	0.2
231	Longbell gravelly coarse sandy loam, 2 to 15 percent slopes	0	2,628	280	0	2,908	0.3
232	Longbell-Lava flows complex, 2 to 15 percent slopes	0	3,677	0	0	3,677	0.3
233	Longbilly-Modoc complex, 0 to 2 percent slopes	1,040	450	0	0	1,490	0.1
234	Longbilly-Pit complex, 0 to 2 percent slopes	3,480	550	0	0	4,030	0.4
235	Longcreek-Vansickle-Rock outcrop complex, 9 to 30 percent slopes	4,475	208	10	0	4,693	0.4
236	Lonkey-Datom complex, 2 to 15 percent slopes	564	200	0	0	764	*
237	Lonkey-Malinda complex, 2 to 15 percent slopes	707	700	0	0	1,407	0.1
238	Lonkey-Malinda complex, 15 to 30 percent slopes	6,097	817	0	0	6,914	0.6
239	Lonkey-Malinda complex, cool, 15 to 30 percent slopes	2,333	160	0	0	2,493	0.2
240	Loveness-Fleener complex, 2 to 15 percent slopes	1,800	43,924	0	0	45,724	4.0
241	Loveness-Fleener complex, 15 to 30 percent slopes	0	4,410	0	0	4,410	0.4
242	Lunsford loam, 0 to 2 percent slopes	1,492	130	0	0	1,622	0.1
243	Malinda extremely gravelly sandy loam, 2 to 15 percent slopes	1,552	20	0	0	1,572	0.1
244	Malinda extremely gravelly sandy loam, 15 to 30 percent slopes	2,196	0	0	0	2,196	0.2
245	Malinda extremely gravelly sandy loam, 30 to 50 percent slopes	709	347	0	0	1,056	*
246	Malinda very cobbly loam, 30 to 50 percent slopes	684	997	0	0	1,681	0.1
247	Matquaw gravelly sandy loam, 0 to 5 percent slopes	0	0	1,331	0	1,331	0.1
248	Matquaw very gravelly sandy loam, 0 to 2 percent slopes	0	0	590	0	590	*
249	Medici-Blankout complex, 15 to 30 percent slopes	0	1,488	0	442	1,930	0.2
250	Medlake gravelly coarse sandy loam, 2 to 15 percent slopes	0	710	0	0	710	*
251	Medlake gravelly coarse sandy loam, 15 to 30 percent slopes	0	335	0	0	335	*
252	Modoc loam, slightly sodic, 0 to 2 percent slopes	1,100	0	0	0	1,100	*
253	Modoc sandy loam, 2 to 5 percent slopes	5,915	1,454	235	0	7,604	0.7
254	Mounthat-Rock outcrop complex, 50 to 75 percent slopes	0	0	695	0	695	*
255	Murken very stony loam, 15 to 30 percent slopes	0	0	1,180	0	1,180	0.1
256	Nanny gravelly sandy loam, 0 to 9 percent slopes	0	0	657	2,926	3,583	0.3
257	Neer gravelly sandy loam, 50 to 75 percent slopes	0	0	817	2,643	3,460	0.3
258	Neer-Ponto, dark surface, complex, 30 to 50 percent slopes	0	0	3,350	0	3,350	0.3

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Lassen County	Modoc County	Shasta County	Siskiyou County	Total-- Area	Total-- Extent
		Acres	Acres	Acres	Acres	Acres	Pct
259	Neer-Ponto complex, 2 to 30 percent slopes-------	0	0	410	18,668	19,078	1.7
260	Neer-Ponto complex, 30 to 50 percent slopes------	0	0	650	3,973	4,623	0.4
261	Neuns-Kettlebelly complex, 50 to 75 percent slopes---------------------------------------	0	0	2,155	0	2,155	0.2
262	Neuns-Kettlebelly, dry, complex, 50 to 75 percent slopes---------------------------------------	0	0	1,672	1,085	2,757	0.2
263	Neuns-Kindig complex, 50 to 75 percent slopes----	0	0	15,101	9,675	24,776	2.2
264	Nikal-Chatterdown-Lava flows complex, 2 to 9 percent slopes--------------------------------	0	0	0	2,645	2,645	0.2
265	Nosoni loam, 0 to 5 percent slopes--------------	35	1,814	895	0	2,744	0.2
266	Obie-Mounthat complex, 5 to 15 percent slopes----	0	0	8,069	2,180	10,249	0.9
267	Obie-Mounthat complex, 15 to 30 percent slopes---	0	0	8,855	1,170	10,025	0.9
268	Obie-Mounthat complex, 30 to 50 percent slopes---	0	0	8,679	5,855	14,534	1.3
269	Odas loam, 0 to 2 percent slopes----------------	0	0	370	2,462	2,832	0.2
270	Oxendine-Lonkey complex, 2 to 9 percent slopes---	825	750	0	0	1,575	0.1
271	Oxendine-Sweagert complex, 0 to 5 percent slopes-	10,527	1,548	60	0	12,135	1.1
272	Oxendine-Sweagert complex, 2 to 5 percent slopes-	0	4,529	0	0	4,529	0.4
273	Oxendine-Sweagert complex, 2 to 9 percent slopes-	1,600	6,764	0	0	8,364	0.7
274	Pastolla muck, 0 to 1 percent slopes------------	380	0	3,005	0	3,385	0.3
275	Pastolla muck, drained, 0 to 2 percent slopes----	1,100	120	4,485	123	5,828	0.5
276	Pastolla mucky silt loam, channeled, 0 to 2 percent slopes--------------------------------	4,840	3,059	0	0	7,899	0.7
277	Patburn loam, 0 to 2 percent slopes-------------	0	0	195	0	195	*
278	Patburn clay loam, 0 to 2 percent slopes---------	656	3,915	0	0	4,571	0.4
279	Pit silty clay, drained, 0 to 2 percent slopes---	6,785	87	2,096	0	8,968	0.8
280	Pit silty clay, frequently flooded, 0 to 1 percent slopes--------------------------------	9,276	0	0	0	9,276	0.8
281	Pits-Dumps complex------------------------------	0	0	215	0	215	*
282	Pittville sandy loam, 0 to 5 percent slopes------	781	880	8,990	0	10,651	0.9
283	Pittville sandy loam, 5 to 9 percent slopes------	0	0	500	0	500	*
284	Pittville sandy loam, 9 to 15 percent slopes-----	327	0	955	0	1,282	0.1
285	Pittville sandy loam, 15 to 30 percent slopes----	87	0	548	0	635	*
286	Ponto sandy loam, 2 to 15 percent slopes---------	0	0	170	5,825	5,995	0.5
287	Ponto-Neer, dark surface, complex, 15 to 30 percent slopes--------------------------------	0	0	1,735	0	1,735	0.2
288	Ponto-Wyntoon complex, 2 to 15 percent slopes----	0	0	540	1,264	1,804	0.2
289	Quaking-Kephart complex, 15 to 30 percent slopes-	0	180	0	0	180	*
290	Ravendale silty clay, 0 to 2 percent slopes------	2,322	195	545	0	3,062	0.3
291	Revit fine sandy loam, 2 to 30 percent slopes----	0	0	265	2,115	2,380	0.2
292	Ricketts-Orhood complex, 2 to 15 percent slopes--	2,859	325	221	0	3,405	0.3
293	Ricketts-Orhood complex, 15 to 30 percent slopes-	3,164	255	0	0	3,419	0.3
294	Ricketts-Orhood complex, 30 to 50 percent slopes-	4,726	2,402	770	0	7,898	0.7
295	Ricketts-Sweagert complex, 2 to 15 percent slopes	0	380	0	0	380	*
296	Ricketts-Searvar complex, 5 to 30 percent slopes-	1,315	0	0	0	1,315	0.1
297	Rivalier very gravelly sandy loam, 15 to 30 percent slopes--------------------------------	2,820	78	0	0	2,898	0.3
298	Rivalier very gravelly sandy loam, 30 to 50 percent slopes--------------------------------	5,480	820	0	0	6,300	0.6
299	Rivalier very gravelly sandy loam, 50 to 75 percent slopes--------------------------------	2,195	0	0	0	2,195	0.2
300	Riverwash--	1,185	160	613	80	2,038	0.2
301	Roundbarn-Said complex, 15 to 30 percent slopes--	1,560	0	0	0	1,560	0.1
302	Rubble land-Argixerolls-Rock outcrop complex, 30 to 75 percent slopes--------------------------	2,931	393	3,320	0	6,644	0.6
303	Rubble land-Rock outcrop complex, 30 to 75 percent slopes--------------------------------	4,812	0	1,944	300	7,056	0.6
304	Rubble land-Typic Vitrixerands complex, 30 to 50 percent slopes--------------------------------	0	0	3,155	0	3,155	0.3
305	Rubble land-Xerorthents complex, 50 to 70 percent slopes---------------------------------------	0	0	150	1,080	1,230	0.1

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Lassen County	Modoc County	Shasta County	Siskiyou County	Total-- Area	Total-- Extent
		Acres	Acres	Acres	Acres	Acres	Pct
306	Scarface sandy loam, 2 to 15 percent slopes	0	0	1,010	0	1,010	*
307	Scarface sandy loam, 15 to 30 percent slopes	0	0	1,285	0	1,285	0.1
308	Scarface-Gasper complex, 2 to 15 percent slopes	0	16,400	6,860	4,894	28,154	2.5
309	Shasta loamy sand, 0 to 5 percent slopes	0	0	850	8,050	8,900	0.8
310	Shastina loam, 0 to 5 percent slopes	0	0	0	1,610	1,610	0.1
311	Splawn-Jellico complex, 5 to 15 percent slopes	2,219	1,645	2,460	0	6,324	0.6
312	Stacher gravelly coarse sandy loam, 15 to 30 percent slopes	0	0	2,440	0	2,440	0.2
313	Stacher gravelly coarse sandy loam, 2 to 15 percent slopes	0	0	860	0	860	*
314	Stacher very gravelly coarse sandy loam, 30 to 50 percent slopes	0	0	1,729	0	1,729	0.2
315	Stoner gravelly sandy loam, 2 to 15 percent slopes	0	0	1,443	1,330	2,773	0.2
316	Stukel complex, 15 to 30 percent slopes	1,170	0	90	0	1,260	0.1
317	Swanberger clay, 0 to 1 percent slopes	0	62	1,695	531	2,288	0.2
318	Swanberger muck, 0 to 1 percent slopes	0	0	590	60	650	*
319	Sweagert loam, 2 to 5 percent slopes	1,238	164	0	0	1,402	0.1
320	Tionesta very gravelly loamy coarse sand, 2 to 15 percent slopes	0	1,622	0	0	1,622	0.1
321	Tionesta very gravelly loamy coarse sand, 15 to 30 percent slopes	1,165	1,838	0	0	3,003	0.3
322	Trojan-Erig complex, 15 to 30 percent slopes	7,032	103	0	0	7,135	0.6
323	Twinbuttes very gravelly coarse sandy loam, 30 to 50 percent slopes	0	0	730	0	730	*
324	Twinbuttes-Lava flows complex, 2 to 15 percent slopes	0	0	2,065	0	2,065	0.2
325	Wengler very gravelly coarse sandy loam, 5 to 15 percent slopes	0	0	2,425	0	2,425	0.2
326	Wengler very gravelly coarse sandy loam, 15 to 30 percent slopes	0	0	1,405	0	1,405	0.1
327	Wengler very gravelly coarse sandy loam, 30 to 50 percent slopes	0	0	760	0	760	*
328	Whipp-Cupvar complex, 0 to 2 percent slopes	0	0	915	0	915	*
329	Whipp-Cupvar complex, slightly saline, 0 to 2 percent slopes	638	0	2,265	0	2,903	0.3
330	Winnibulli loam, 0 to 2 percent slopes	0	1,357	1,385	1,359	4,101	0.4
331	Winnibulli loam, gravelly substratum, 0 to 5 percent slopes	0	0	390	0	390	*
332	Winnibulli-Burman complex, 0 to 5 percent slopes	641	862	4,491	455	6,449	0.6
333	Witcher-Gosch complex, 2 to 15 percent slopes	0	7,042	0	0	7,042	0.6
334	Witcher-Gosch complex, 15 to 30 percent slopes	0	12,865	0	0	12,865	1.1
335	Wyntoon sandy loam, 2 to 15 percent slopes	210	0	8,745	6,099	15,054	1.3
336	Wyntoon sandy loam, 15 to 30 percent slopes	0	0	1,820	0	1,820	0.2
337	Wyntoon-Depner complex, 5 to 15 percent slopes	0	0	1,225	0	1,225	0.1
338	Zeugirdor-Goulder complex, 15 to 30 percent slopes	0	0	1,290	0	1,290	0.1
339	Zeugirdor-Goulder complex, 30 to 50 percent slopes	0	0	5,705	0	5,705	0.5
397	Water	1,285	2,955	8,655	0	12,895	1.1
398	Gravel pits	0	0	325	0	325	*
	Total	287,001	286,611	425,341	136,275	1,135,228	100.0

* Less than 0.1 percent.

Table 5.--Yields per Acre of Crops and Pasture

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Alfalfa hay	Barley	Grass-legume hay	Pasture	Irish potatoes	Wheat
	Tons	Bu	Tons	AUM*	Cwt	Bu
107:						
Bieber	4.5	40	3.0	7.5	---	45
Esperanza	5.5	95	4.5	9.0	---	90
108:						
Bieber	4.5	40	3.0	7.5	---	45
Modoc	5.0	70	4.5	8.5	300	45
131 Chalkford	5.0	70	3.5	7.5	---	75
138 Cupvar	---	20	1.5	4.0	---	---
142 Daphnedale	4.5	40	3.5	8.5	---	45
151, 152, 153, 154, 155 Dotta	6.0	85	5.0	10.0	350	95
159, 160:						
Dudgen	4.5	40	3.0	7.5	---	45
Graven	4.5	40	3.5	8.5	---	45
161, 162 Esperanza	5.5	85	4.5	9.0	---	90
211, 212, 213 Keddie	---	---	3.0	7.0	---	---
226 Lasvar	---	20	1.5	4.0	---	---
227:						
Lasvar	---	20	1.5	4.0	---	---
Pitvar	---	20	1.5	4.0	---	---
233:						
Longbilly	---	---	2.5	6.5	---	---
Modoc	---	---	3.0	7.0	---	---
234:						
Longbilly	---	---	2.5	6.5	---	---
Pit	---	---	3.5	7.0	---	---
242 Lunsford	6.0	85	---	10.0	---	---
247, 248 Matquaw	6.0	85	5.0	10.0	300	95

See footnote at end of table.

Table 5.--Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Alfalfa hay	Barley	Grass-legume hay	Pasture	Irish potatoes	Wheat
	Tons	Bu	Tons	AUM*	Cwt	Bu
252, 253 Modoc	5.0	70	4.5	8.5	300	75
265 Nosoni	4.5	70	3.0	7.5	---	75
269 Odas	6.0	85	5.0	10.0	300	95
271:						
Oxendine	4.0	50	3.0	7.0	200	40
Sweagert	5.0	70	4.5	8.5	300	75
274, 275, 276 Pastolla	---	---	5.0	10.0	---	---
278 Patburn	5.5	85	4.5	9.0	---	90
279, 280 Pit	---	---	3.5	8.0	---	---
282, 283, 284, 285 Pittville	6.0	85	5.0	10.0	300	95
315 Stoner	---	---	5.0	10.0	---	---
317 Swanberger	4.0	---	3.5	8.5	---	---
318 Swanberger	---	---	3.5	8.5	---	---
319 Sweagert	5.0	70	4.5	8.5	300	75
328, 329:						
Whipp	---	20	1.5	4.0	---	---
Cupvar	---	20	1.5	4.0	---	---
330, 331 Winnibulli	5.0	70	3.5	7.5	---	75
332:						
Winnibulli	5.0	70	3.5	7.5	---	75
Burman	4.5	1.0	3.0	7.5	---	---

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

Table 6.--Land Capability

Soil name and map symbol	Land capability N	Land capability I
101, 102, 103, 104 Adinot	VIIs	---
105:		
Adinot	VIIs	---
Adinot, eroded	VIIs	---
106:		
Badenaugh	IVs	---
Matquaw	IVe	---
107:		
Bieber	IVs	IVs
Esperanza	IIIs	IIs
108:		
Bieber	VIe	VIe
Modoc	VIe	IIIe
109:		
Blankout	IVe	---
Medici	IVs	---
110:		
Boardburn	IIIe	---
Hambone	IVe	---
111, 112, 113 Bollibokka	VIe	---
114, 115 Britton	IVe	---
116 Britton	VIe	---
117, 118:		
Bundora	IVs	---
Goulder	IVe	---
119:		
Bundora	VIs	---
Goulder	VIe	---
120 Bunselmeier	IVs	---
121:		
Burman	IVs	---
Lasvar	IVw	---
122:		
Burney	IIIe	---

Table 6.--Land Capability--Continued

Soil name and map symbol	Land capability N	Land capability I
122:		
Arkright	IVe	---
123, 124:		
Canyoncreek	VIe	---
Hermit	VIe	---
125, 126 Carberry	IVe	---
127 Carberry	VIe	---
128:		
Carberry	IIIe	---
Ponto	IIIe	---
129:		
Carberry	IVe	---
Ponto	IVe	---
130:		
Carberry	IVe	---
Lava flows	VIII	---
131 Chalkford	IIIw	IIIw
132:		
Chatterdown	IIIe	---
Nikal	IVe	---
133:		
Chirpchatter	IIIe	---
Hunsinger	IVe	---
134, 135 Coneward	IVs	---
136 Coneward	VIs	---
137:		
Coneward	IVs	---
Lava flows	VIII	---
138 Cupvar	IVw	IVw
139 Danhunt	IVe	---
140 Danhunt	VIe	---

Table 6.--Land Capability--Continued

Soil name and map symbol	Land capability N	Land capability I
141----------------------- Danhunt	VIIe	---
142----------------------- Daphnedale	IVe	IVe
143----------------------- Datom	IVe	IVe
144----------------------- Dekkas	IVs	---
145----------------------- Depner	IVe	---
146----------------------- Depner	VIe	---
147----------------------- Deven	VIIs	---
148, 149------------------ Deven	VIIe	---
150:		
Dosa---------------------	Vw	---
Burman-------------------	IVw	---
151----------------------- Dotta	IIIw	IIIw
152, 153------------------ Dotta	IIIe	IIe
154----------------------- Dotta	IIIe	IIIe
155----------------------- Dotta	IVe	IVe
156:		
Dotta--------------------	IIIe	IIe
Esperanza----------------	IIIe	IIe
157:		
Dotta--------------------	IVe	---
Ricketts-----------------	IVs	---
158:		
Dotta--------------------	IIIe	---
Searvar------------------	IVe	---
159:		
Dudgen-------------------	IVe	IVe
Graven-------------------	IIIe	IIIe

Table 6.--Land Capability--Continued

Soil name and map symbol	Land capability N	Land capability I
160:		
Dudgen	IVw	IVw
Graven	IIIe	IIIe
161 Esperanza	IIIe	IIe
162 Esperanza	IIIs	IIs
163 Esro	Vw	---
164:		
Etsel	VIIe	---
Neuns	VIIe	---
165:		
Fiddler	VIs	---
Deven	VIIe	---
166:		
Fiddler	VIe	---
Deven	VIIe	---
167, 168:		
Fiddler	VIs	---
Whitinger	VIs	---
169:		
Gardens	Vw	---
Jacksback	Vw	---
170:		
Gasper	IVe	---
Scarface	IVe	---
171:		
Gasper	VIe	---
Scarface	VIe	---
172, 173:		
Gasper	IVe	---
Scarface	IVe	---
174:		
Gasper	VIe	---
Scarface	VIe	---
175 Gooval	IVw	---

Table 6.--Land Capability--Continued

Soil name and map symbol	Land capability N	Land capability I
176-----------------------Gosch	VIs	---
177:		
Gosch--------------------	VIe	---
Witcher------------------	VIe	---
178, 179------------------Goulder	IVe	---
180-----------------------Goulder	VIe	---
181:		
Gullied land-------------	VIII	---
Rock outcrop-------------	VIII	---
Mounthat-----------------	VIIe	---
182:		
Hambone------------------	IVe	---
Boardburn----------------	IVe	---
183:		
Hambone------------------	VIe	---
Boardburn----------------	VIe	---
184, 185------------------Henhill	IIIw	IIw
186:		
Hermit-------------------	VIe	---
Canyoncreek--------------	VIe	---
187:		
Hunsinger----------------	IVe	---
Chirpchatter-------------	IIIe	---
188:		
Hunsinger----------------	IVe	---
Chirpchatter-------------	IVe	---
189:		
Hunsinger----------------	VIe	---
Chirpchatter-------------	VIe	---
190-----------------------Jacksback	Vw	---
191, 192------------------Jadpor	IVs	IVs

Table 6.--Land Capability--Continued

Soil name and map symbol	Land capability N	Land capability I
193:		
Jahjo	VIIs	---
Lava flows	VIII	---
Loveness	IIIe	---
194:		
Jellico	VIs	---
Lava flows	VIII	---
195:		
Jellico	VIs	---
Splawn	IVs	---
196:		
Jellico	VIe	---
Splawn	VIe	---
197 Jellycamp	VIIs	---
198, 199:		
Jellycamp	VIIs	---
Karcal	VIs	---
Longcreek	VIIs	---
200:		
Jellycamp	VIIs	---
Lassen	IVe	---
Longcreek	VIIs	---
201:		
Jellycamp	VIIs	---
Ollierivas	IVe	---
202:		
Jellycamp	VIIs	---
Splawn	IVs	---
Ollierivas	IVe	---
203:		
Jellycamp	VIIs	---
Splawn	IVs	---
Ricketts	IVs	---
204, 205, 206:		
Jellycamp	VIIs	---
Vansickle	VIIs	---

Table 6.--Land Capability--Continued

Soil name and map symbol	Land capability N	Land capability I
207:		
Jimmerson loam	IIIe	---
Jimmerson stony sandy loam	IVe	---
208:		
Jimmerson loam	IVe	---
Jimmerson stony sandy loam	IVe	---
209:		
Jimmerson stony loam	VIe	---
Jimmerson loam	VIe	---
210:		
Karcal	VIs	---
Cuppy	IVe	---
211 Keddie	VIw	IVw
212, 213 Keddie	IIIw	IIIw
214:		
Kephart	IVs	---
Quaking	IVe	---
215 Kettlebelly	IVe	---
216:		
Kettlebelly	IVe	---
Neuns	IVe	---
217:		
Kettlebelly	VIe	---
Neuns	VIe	---
218:		
Kettlebelly	IVe	---
Neuns	IVe	---
219:		
Kettlebelly	VIe	---
Neuns	VIe	---
220 Kilarc	IIIe	---
221 Kilarc	IVe	---

Table 6.--Land Capability--Continued

Soil name and map symbol	Land capability N	Land capability I
222 Kilarc	VIe	---
223:		
Kindig	IVe	---
Neuns	IVe	---
224:		
Kindig	VIe	---
Neuns	VIe	---
225:		
Lassen	IVe	---
Cuppy	IVe	---
226 Lasvar	IVw	IVw
227:		
Lasvar	IVw	IVw
Pitvar	Vw	Vw
228 Lava flows	VIII	---
229:		
Lava flows	VIII	---
Gassaway	VIIs	---
230:		
Lava flows	VIII	---
Neer	VIe	---
231 Longbell	IVe	---
232:		
Longbell	IVe	---
Lava flows	VIII	---
233:		
Longbilly	VIIs	IIIs
Modoc	VIe	IIIe
234:		
Longbilly	VIIs	IIIs
Pit	IVw	IVw
235:		
Longcreek	VIIs	---
Vansickle	VIIs	---
Rock outcrop	VIII	---

Table 6.--Land Capability--Continued

Soil name and map symbol	Land capability N	Land capability I
236:		
Lonkey	IIIe	---
Datom	IVe	---
237, 238, 239:		
Lonkey	IVe	---
Malinda	VIs	---
240:		
Loveness	IIIe	---
Fleener	IVe	---
241:		
Loveness	IVe	---
Fleener	IVe	---
242 Lunsford	IIIw	IIIw
243, 244 Malinda	VIs	---
245, 246 Malinda	VIe	---
247, 248 Matquaw	IVw	IVw
249:		
Medici	IVe	---
Blankout	IVe	---
250, 251 Medlake	VIe	---
252 Modoc	VIs	IIIs
253 Modoc	VIe	IIIe
254:		
Mounthat	VIIe	---
Rock outcrop	VIII	---
255 Murken	VIs	---
256 Nanny	IIIe	IIIe
257 Neer	VIIe	---
258:		
Neer	VIe	---

Table 6.--Land Capability--Continued

Soil name and map symbol	Land capability N	Land capability I
258:		
Ponto	VIe	---
259:		
Neer	IVe	---
Ponto	IVe	---
260:		
Neer	VIe	---
Ponto	VIe	---
261, 262:		
Neuns	VIIe	---
Kettlebelly	VIIe	---
263:		
Neuns	VIIe	---
Kindig	VIIe	---
264:		
Nikal	IVe	---
Chatterdown	IIIe	---
Lava flows	VIII	---
265 Nosoni	IIIw	IIIw
266, 267:		
Obie	IVe	---
Mounthat	IVs	---
268:		
Obie	VIe	---
Mounthat	VIe	---
269 Odas	IIIw	IIIw
270:		
Oxendine	VIIe	---
Lonkey	IIIe	---
271:		
Oxendine	VIIs	VIIs
Sweagert	IIIe	IIIe
272, 273:		
Oxendine	VIIs	---
Sweagert	IIIe	---

Table 6.--Land Capability--Continued

Soil name and map symbol	Land capability N	Land capability I
274, 275, 276: Pastolla	IVw	IVw
277: Patburn	IIIw	IIIw
278: Patburn	IIIw	IIw
279, 280: Pit	IVw	IVw
281. Pits-Dumps		
282: Pittville	IIc	IIc
283, 284: Pittville	IVe	IIIe
285: Pittville	IVe	IVe
286: Ponto	IIIe	---
287:		
Ponto	IVe	---
Neer	IVe	---
288:		
Ponto	IIIe	---
Wyntoon	IIIe	---
289:		
Quaking	IVs	---
Kephart	IVe	---
290: Ravendale	IVs	IVs
291: Revit	IVe	---
292, 293:		
Ricketts	IVs	---
Orhood	VIIs	---
294:		
Ricketts	VIe	---
Orhood	VIIe	---
295:		
Ricketts	IVe	---
Sweagert	IVw	---

Table 6.--Land Capability--Continued

Soil name and map symbol	Land capability N	Land capability I
296:		
Ricketts	IVe	---
Searvar	IVe	---
297 Rivalier	VIs	---
298 Rivalier	VIe	---
299 Rivalier	VIIe	---
300 Riverwash	VIII	---
301:		
Roundbarn	IVe	---
Said	VIe	---
302:		
Rubble land	VIII	---
Argixerolls	VIII	---
Rock outcrop	VIII	---
303:		
Rubble land	VIII	---
Rock outcrop	VIII	---
304:		
Rubble land	VIII	---
Typic Vitrixerands	VIs	---
305:		
Rubble land	VIII	---
Xerorthents	VIIe	---
306, 307 Scarface	IVe	---
308:		
Scarface	IVe	---
Gasper	IVe	---
309 Shasta	IIIs	---
310 Shastina	IIIe	---
311:		
Splawn	IVs	---
Jellico	VIs	---

Table 6.--Land Capability--Continued

Soil name and map symbol	Land capability N	Land capability I
312, 313: Stacher	IVe	---
314: Stacher	VIe	---
315: Stoner	IIIe	IIe
316:		
Stukel gravelly sandy loam	VIIs	---
Stukel very cobbly sandy loam	VIIe	---
317, 318: Swanberger	Vw	Vw
319: Sweagert	IIIe	IIIe
320, 321: Tionesta	VIs	---
322:		
Trojan	IVe	---
Erig	IVe	---
323: Twinbuttes	VIIe	---
324:		
Twinbuttes	VIIe	---
Lava flows	VIII	---
325, 326: Wengler	IVe	---
327: Wengler	VIe	---
328, 329:		
Whipp	IVw	IVw
Cupvar	IVw	IVw
330, 331: Winnibulli	IIIw	IIIw
332:		
Winnibulli	IIIw	IIIw
Burman	IVw	IIIw
333, 334:		
Witcher	IVe	---
Gosch	VIe	---

Table 6.--Land Capability--Continued

Soil name and map symbol	Land capability N	Land capability I
335----------------------- Wyntoon	IIIe	---
336----------------------- Wyntoon	IVe	---
337:		
Wyntoon------------------	IIIe	---
Depner-------------------	IIIe	---
338:		
Zeugirdor----------------	VIe	---
Goulder------------------	IVe	---
339:		
Zeugirdor----------------	VIe	---
Goulder------------------	VIe	---

Table 7.--Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
107	Bieber-Esperanza complex, 0 to 2 percent slopes (where irrigated)
121	Burman-Lasvar complex, 0 to 2 percent slopes (where irrigated and drained)
131	Chalkford loam, 0 to 2 percent slopes
150	Dosa-Burman complex, 0 to 2 percent slopes (where irrigated and drained)
151	Dotta loam, gravelly substratum, 0 to 2 percent slopes (where irrigated)
152	Dotta sandy loam, 2 to 5 percent slopes (where irrigated)
153	Dotta sandy loam, 5 to 9 percent slopes (where irrigated)
156	Dotta-Esperanza complex, moist, 0 to 5 percent slopes (where irrigated)
159	Dudgen-Graven complex, 0 to 5 percent slopes (where irrigated)
160	Dudgen-Graven complex, flooded, 0 to 5 percent slopes (where irrigated)
161	Esperanza sandy loam, 2 to 5 percent slopes (where irrigated)
162	Esperanza loam, 0 to 2 percent slopes (where irrigated)
184	Henhill silt loam, partially drained, 0 to 2 percent slopes (where irrigated and drained)
185	Henhill silt loam, gravelly substratum, 0 to 2 percent slopes (where drained and either protected from flooding or not frequently flooded during the growing season)
191	Jadpor gravelly sandy loam, 0 to 5 percent slopes (where drained and either protected from flooding or not frequently flooded during the growing season)
211	Keddie muck, 0 to 1 percent slopes (where drained and either protected from flooding or not frequently flooded during the growing season)
212	Keddie loam, 0 to 2 percent slopes (where drained and either protected from flooding or not frequently flooded during the growing season)
213	Keddie silt loam, 0 to 2 percent slopes (where drained and either protected from flooding or not frequently flooded during the growing season)
226	Lasvar clay, 0 to 2 percent slopes (where drained)
227	Lasvar-Pitvar complex, 0 to 2 percent slopes (where irrigated and drained)
233	Longbilly-Modoc complex, 0 to 2 percent slopes (where irrigated)
236	Lonkey-Datom complex, 2 to 15 percent slopes (where irrigated)
242	Lunsford loam, 0 to 2 percent slopes (where drained and either protected from flooding or not frequently flooded during the growing season)
247	Matquaw gravelly sandy loam, 0 to 5 percent slopes (where irrigated)
252	Modoc loam, slightly sodic, 0 to 2 percent slopes (where irrigated)
253	Modoc sandy loam, 2 to 5 percent slopes (where irrigated)
265	Nosoni loam, 0 to 5 percent slopes (where irrigated and either protected from flooding or not frequently flooded during the growing season)
269	Odas loam, 0 to 2 percent slopes (where drained and either protected from flooding or not frequently flooded during the growing season)
274	Pastolla muck, 0 to 1 percent slopes (where drained and either protected from flooding or not frequently flooded during the growing season)
275	Pastolla muck, drained, 0 to 2 percent slopes (where drained and either protected from flooding or not frequently flooded during the growing season)
277	Patburn loam, 0 to 2 percent slopes (where irrigated)
278	Patburn clay loam, 0 to 2 percent slopes (where drained and either protected from flooding or not frequently flooded during the growing season)
279	Pit silty clay, drained, 0 to 2 percent slopes (where drained)
280	Pit silty clay, frequently flooded, 0 to 1 percent slopes (where irrigated and either protected from flooding or not frequently flooded during the growing season)
282	Pittville sandy loam, 0 to 5 percent slopes (where irrigated)
283	Pittville sandy loam, 5 to 9 percent slopes (where irrigated)
290	Ravendale silty clay, 0 to 2 percent slopes (where irrigated and drained)
315	Stoner gravelly sandy loam, 2 to 15 percent slopes (where irrigated)
317	Swanberger clay, 0 to 1 percent slopes (where drained)
318	Swanberger muck, 0 to 1 percent slopes (where drained)
319	Sweagert loam, 2 to 5 percent slopes (where irrigated)
330	Winnibulli loam, 0 to 2 percent slopes (where irrigated)
331	Winnibulli loam, gravelly substratum, 0 to 5 percent slopes (where irrigated and either protected from flooding or not frequently flooded during the growing season)
332	Winnibulli-Burman complex, 0 to 5 percent slopes (where irrigated)

Table 8.--Rangeland Productivity and Characteristic Plant Communities

(Only the soils that support rangeland vegetation suitable for grazing are listed. MAP stands for mean annual precipitation)

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Compo- sition
			Lb/acre		Pct
101---------------- Adinot	Shallow Gravelly Loam, MAP 14-16 (21e).	Favorable	1,000	Needlegrass-------------------	30
		Normal	800	Bottlebrush squirreltail------	20
		Unfavorable	600	Low sagebrush-----------------	15
102, 103, 104------ Adinot	Shallow Cobbly Loam, MAP 14-16 (21e).	Favorable	1,000	Bluebunch wheatgrass----------	35
		Normal	800	Thurber needlegrass-----------	20
		Unfavorable	600	Low sagebrush-----------------	15
105:					
Adinot------------	Shallow Gravelly Loam, MAP 14-16 (21e).	Favorable	1,000	Needlegrass-------------------	30
		Normal	800	Bottlebrush squirreltail------	20
		Unfavorable	600	Low sagebrush-----------------	15
Adinot, eroded----	Eroded Shallow Gravelly Loam, MAP 14-16 (21e).	Favorable	300	Low sagebrush-----------------	30
		Normal	200	Wright buckwheat--------------	20
		Unfavorable	100	Bottlebrush squirreltail------	10
				Sandberg bluegrass------------	10
106:					
Badenaugh---------	Sandy Loam, MAP 14-16 (21e)---	Favorable	1,100	Thurber needlegrass-----------	15
		Normal	900	Indian ricegrass--------------	15
		Unfavorable	700	Rubber rabbitbrush------------	15
				Mountain big sagebrush--------	10
Matquaw-----------	Sandy Loam, MAP 14-16 (21e)---	Favorable	1,100	Indian ricegrass--------------	15
		Normal	900	Thurber needlegrass-----------	15
		Unfavorable	700	Rubber rabbitbrush------------	15
				Mountain big sagebrush--------	10
107:					
Bieber------------	Shallow Loamy Intermounds, MAP 14-16 (21e).	Favorable	1,000	Idaho fescue------------------	50
		Normal	700	Low sagebrush-----------------	20
		Unfavorable	500	Bluebunch wheatgrass----------	15
				Sandberg bluegrass------------	5
Esperanza---------	Loamy Claypan, MAP 14-18 (21e)	Favorable	2,000	Lemmon needlegrass------------	30
		Normal	1,800	Antelope bitterbrush----------	20
		Unfavorable	1,600	Low sagebrush-----------------	10
				Rubber rabbitbrush------------	10
				Beardless wildrye-------------	10
108:					
Bieber------------	Shallow Loamy Intermounds, MAP 14-16 (21e).	Favorable	700	Sandberg bluegrass------------	20
		Normal	600	Low sagebrush-----------------	20
		Unfavorable	500	Bottlebrush squirreltail------	15
				Wright buckwheat--------------	5
Modoc-------------	Loam, MAP 14-16 (21e)---------	Favorable	1,800	Basin wildrye-----------------	40
		Normal	1,500	Beardless wildrye-------------	10
		Unfavorable	1,200	Basin big sagebrush-----------	10
				Bluebunch wheatgrass----------	5
				Thurber needlegrass-----------	5
				Bottlebrush squirreltail------	5

Table 8.--Rangeland Productivity and Characteristic Plant Communities--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Compo- sition
			Lb/acre		Pct
120 Bunselmeier	Gravelly Loam, MAP 14-18 (21e)	Favorable	1,100	Bluebunch wheatgrass	35
		Normal	900	Thurber needlegrass	10
		Unfavorable	700	Antelope bitterbrush	10
				Mountain big sagebrush	10
				Idaho fescue	10
121:					
Burman	Shallow Cool Loam, MAP 18+ (22d).	Favorable	600	Low sagebrush	20
		Normal	700	Idaho fescue	20
		Unfavorable	800	Thurber needlegrass	20
Lasvar	Clay Flat, MAP 18+ (22d)	Favorable	1,000	Yampa	75
		Normal	700	Danthonia	5
		Unfavorable	500	Bluegrass	5
142 Daphnedale	Diatomaceous Loam, MAP 14-16 (21e).	Favorable	2,400	Bottlebrush squirreltail	40
		Normal	2,000	Bluebunch wheatgrass	10
		Unfavorable	1,600	Rubber rabbitbrush	10
				Mountain big sagebrush	10
143 Datom	Diatomaceous Loam, MAP 14-16 (21e).	Favorable	2,400	Basin wildrye	40
		Normal	2,000	Bluebunch wheatgrass	10
		Unfavorable	1,600	Rubber rabbitbrush	10
				Mountain big sagebrush	10
147, 148, 149 Deven	Shallow Cobbly Loam, MAP 14-16 (21e).	Favorable	500	Low sagebrush	20
		Normal	400	Thurber needlegrass	20
		Unfavorable	300	Bottlebrush squirreltail	10
				Canby bluegrass	10
				Antelope bitterbrush	5
				Bluebunch wheatgrass	5
150:					
Dosa	Wet Meadow, MAP 20+ (22e)	Favorable	1,000	Tufted hairgrass	15
		Normal	700	Bentgrass	15
		Unfavorable	500	Bluegrass	15
				Carex	5
				Rush	5
Burman	Wet Meadow, MAP 20+ (22e)	Favorable	1,200	Bluegrass	25
		Normal	1,000	Low sagebrush	15
		Unfavorable	800	Bottlebrush squirreltail	10
151 Dotta	Deep Loam, MAP 14-16 (21e)	Favorable	2,400	Basin wildrye	30
		Normal	2,000	Beardless wildrye	15
		Unfavorable	1,600	Mountain big sagebrush	10
152, 153, 154, 155 Dotta	Deep Loam, MAP 14-16 (21e)	Favorable	1,200	Basin wildrye	30
		Normal	1,000	Beardless wildrye	15
		Unfavorable	600	Mountain big sagebrush	10
156:					
Dotta	Deep Loam, MAP 14-16 (21e)	Favorable	1,200	Basin wildrye	30
		Normal	1,000	Beardless wildrye	15
		Unfavorable	600	Mountain big sagebrush	10
Esperanza	Loamy Claypan, MAP 14-18 (21e)	Favorable	2,000	Lemmon needlegrass	30
		Normal	1,800	Antelope bitterbrush	20
		Unfavorable	1,600	Low sagebrush	10
				Rubber rabbitbrush	10
				Beardless wildrye	10

Table 8.--Rangeland Productivity and Characteristic Plant Communities--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
157:					
Dotta	Cool Deep Loam, MAP 16-18 (21e).	Favorable	1,400	Idaho fescue	40
		Normal	2,000	Antelope bitterbrush	15
		Unfavorable	800	Bluebunch wheatgrass	10
				Mountain big sagebrush	10
Ricketts	Cool Cobbly Loam, MAP 16-18 (21e).	Favorable	2,000	Idaho fescue	25
		Normal	1,600	Bluebunch wheatgrass	15
		Unfavorable	1,200	Mountain big sagebrush	10
				Antelope bitterbrush	10
158:					
Dotta	Cool Deep Loam, MAP 16-18 (21e).	Favorable	1,200	Beardless wheatgrass	20
		Normal	1,000	Bottlebrush squirreltail	20
		Unfavorable	800	Western juniper	15
				Bluebunch wheatgrass	10
				Idaho fescue	10
				Big sagebrush	10
				Thurber needlegrass	5
				Antelope bitterbrush	5
				Buckbrush	5
Searvar	Cool Cobbly Loam, MAP 16-18 (21e).	Favorable	2,000	Idaho fescue	25
		Normal	1,600	Bluebunch wheatgrass	15
		Unfavorable	1,200	Mountain big sagebrush	10
				Antelope bitterbrush	10
159:					
Dudgen	Shallow Loam, MAP 14-18 (21e)	Favorable	1,200	Bluegrass	25
		Normal	1,000	Low sagebrush	15
		Unfavorable	800	Bottlebrush squirreltail	10
Graven	Shallow Loam, MAP 14-18 (21e)	Favorable	1,200	Bluegrass	25
		Normal	1,000	Low sagebrush	15
		Unfavorable	800	Bottlebrush squirreltail	10
160:					
Dudgen	Shallow Loam, MAP 14-18 (21e)	Favorable	1,200	Lemmon needlegrass	40
		Normal	1,000	Bluegrass	25
		Unfavorable	800	Bottlebrush squirreltail	10
				Low sagebrush	10
				Bluebunch wheatgrass	5
				Onespike oatgrass	5
Graven	Shallow Loam, MAP 14-18 (21e)	Favorable	1,200	Lemmon needlegrass	40
		Normal	1,000	Sandberg bluegrass	25
		Unfavorable	800	Bottlebrush squirreltail	10
				Low sagebrush	10
				Onespike oatgrass	5
161, 162 Esperanza	Loamy Claypan, MAP 14-18 (21e)	Favorable	2,000	Lemmon needlegrass	30
		Normal	1,800	Antelope bitterbrush	20
		Unfavorable	1,600	Low sagebrush	10
				Rubber rabbitbrush	10
				Beardless wildrye	10
163 Esro	Wet Meadow, MAP 20+ (22e)	Favorable	2,500	Tufted hairgrass	15
		Normal	2,000	Bluegrass	15
		Unfavorable	1,500	Carex	15
				Rush	15
				Bentgrass	15

Table 8.--Rangeland Productivity and Characteristic Plant Communities--Continued

Soil name and map symbol	Range site	Kind of year	Total production Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
165, 166:					
Fiddler	Stony Loam, MAP 14-18 (21e)	Favorable	1,800	Bluebunch wheatgrass	25
		Normal	1,400	Thurber needlegrass	20
		Unfavorable	1,000	Mountain big sagebrush	10
				Rabbitbrush	10
				Idaho fescue	5
				Antelope bitterbrush	5
Deven	Shallow Cobbly Loam, MAP 14-18 (21e).	Favorable	500	Low sagebrush	20
		Normal	400	Thurber needlegrass	20
		Unfavorable	300	Bottlebrush squirreltail	10
				Canby bluegrass	10
				Antelope bitterbrush	5
				Bluebunch wheatgrass	5
167, 168:					
Fiddler	Stony Loam, MAP 14-18 (21e)	Favorable	1,800	Bluebunch wheatgrass	25
		Normal	1,400	Thurber needlegrass	20
		Unfavorable	1,000	Mountain big sagebrush	10
				Rabbitbrush	10
				Idaho fescue	5
				Antelope bitterbrush	5
Whitinger	Stony Loam, MAP 14-18 (21e)	Favorable	1,400	Bluebunch wheatgrass	25
		Normal	1,200	Thurber needlegrass	20
		Unfavorable	1,000	Mountain big sagebrush	10
				Rubber rabbitbrush	10
				Idaho fescue	5
169:					
Gardens	Wet Meadow, MAP 20+ (22e)	Favorable	2,000	Tufted hairgrass	15
		Normal	1,600	Bluegrass	15
		Unfavorable	1,200	Carex	15
				Rush	15
				Bentgrass	15
Jacksback.					
193:					
Jahjo	Sandy Loam, MAP 18+ (22d)	Favorable	1,000	Western needlegrass	60
		Normal	900	Antelope bitterbrush	20
		Unfavorable	800	Mountain big sagebrush	10
Lava flows.					
Loveness.					
197 Jellycamp	Shallow Cool Gravelly Loam, MAP 16-18 (21e).	Favorable	1,000	Idaho fescue	35
		Normal	800	Low sagebrush	15
		Unfavorable	800	Junegrass	15
198:					
Jellycamp	Shallow Very Stony Loam, MAP 14-18 (21e).	Favorable	600	Low sagebrush	20
		Normal	500	Bluebunch wheatgrass	15
		Unfavorable	400	Thurber needlegrass	15
				Wright buckwheat	10

Table 8.--Rangeland Productivity and Characteristic Plant Communities--Continued

Soil name and map symbol	Range site	Kind of year	Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
198:					
Karcal	Shallow Cobbly Clay, MAP 14-16 (21e).	Favorable	400	Low sagebrush	35
		Normal	300	Bluebunch wheatgrass	20
		Unfavorable	250	Nevada bluegrass	15
				Needlegrass	5
				Arrowleaf balsamroot	5
Longcreek	Stony Loam, MAP 14-18 (21e)	Favorable	900	Bluebunch wheatgrass	40
		Normal	700	Thurber needlegrass	15
		Unfavorable	500	Mountain big sagebrush	15
				Antelope bitterbrush	5
				Basin wildrye	5
199:					
Jellycamp	Shallow Cobbly Clay, MAP 14-16 (21e).	Favorable	600	Low sagebrush	20
		Normal	400	Idaho fescue	20
		Unfavorable	300	Bluebunch wheatgrass	15
				Thurber needlegrass	10
Karcal	Shallow Cobbly Clay, MAP 14-16 (21e).	Favorable	1,000	Bluebunch wheatgrass	20
		Normal	800	Needlegrass	15
		Unfavorable	600	Low sagebrush	15
				Bottlebrush squirreltail	15
				Nevada bluegrass	5
				Danthonia	5
				Giant wildrye	5
				Streambank wheatgrass	5
				Western serviceberry	5
				Antelope bitterbrush	5
				Rubber rabbitbrush	5
				Arrowleaf balsamroot	5
				Wooly wyethia	5
				Hawksbeard	5
Longcreek	Stony Loam, MAP 14-18 (21e)	Favorable	900	Bluebunch wheatgrass	40
		Normal	700	Thurber needlegrass	15
		Unfavorable	500	Mountain big sagebrush	15
				Antelope bitterbrush	5
				Basin wildrye	5
200:					
Jellycamp	Shallow Very Stony Loam, MAP 14-18 (21e).	Favorable	600	Low sagebrush	20
		Normal	500	Bluebunch wheatgrass	15
		Unfavorable	400	Thurber needlegrass	15
				Wright buckwheat	10
Lassen	Cobbly Clay, MAP 14-16 (21e)	Favorable	1,300	Lemmon needlegrass	20
		Normal	1,000	Bluebunch wheatgrass	15
		Unfavorable	700	Bottlebrush squirreltail	15
				Mountain big sagebrush	10
				Mountain brome	10
				Rubber rabbitbrush	10
				Idaho fescue	5
Longcreek	Stony Loam, MAP 14-18 (21e)	Favorable	900	Bluebunch wheatgrass	40
		Normal	700	Thurber needlegrass	15
		Unfavorable	500	Mountain big sagebrush	15
				Antelope bitterbrush	5
				Basin wildrye	5

Table 8.--Rangeland Productivity and Characteristic Plant Communities--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
201:					
Jellycamp----------	Shallow Very Stony Loam, MAP 14-18 (21e).	Favorable	600	Low sagebrush-----------------	20
		Normal	500	Bluebunch wheatgrass----------	15
		Unfavorable	400	Thurber needlegrass-----------	15
				Wright buckwheat--------------	10
Ollierivas--------	Shallow Loam, MAP 14-18 (21e)	Favorable	1,200	Bluegrass---------------------	25
		Normal	1,000	Low sagebrush-----------------	15
		Unfavorable	800	Bottlebrush squirreltail------	10
202:					
Jellycamp----------	Shallow Very Stony Loam, MAP 14-18 (21e).	Favorable	600	Low sagebrush-----------------	20
		Normal	500	Bluebunch wheatgrass----------	15
		Unfavorable	400	Thurber needlegrass-----------	15
				Wright buckwheat--------------	10
Splawn.					
Ollierivas--------	Shallow Loam, MAP 14-18 (21e)	Favorable	1,200	Bluegrass---------------------	25
		Normal	1,000	Low sagebrush-----------------	15
		Unfavorable	800	Bottlebrush squirreltail------	10
203:					
Jellycamp----------	Shallow Loam, MAP 14-18 (21e)	Favorable	1,200	Bluegrass---------------------	25
		Normal	1,000	Bottlebrush squirreltail------	25
		Unfavorable	800	Low sagebrush-----------------	15
Splawn.					
Ricketts----------	Cobbly Loam, MAP 14-16 (21e)--	Favorable	1,400	Lemmon needlegrass------------	45
		Normal	1,200	Rubber rabbitbrush------------	15
		Unfavorable	1,000	Bluebunch wheatgrass----------	10
				Mountain big sagebrush--------	10
204:					
Jellycamp----------	Shallow Very Stony Loam, MAP 14-18 (21e).	Favorable	600	Low sagebrush-----------------	20
		Normal	500	Bluebunch wheatgrass----------	15
		Unfavorable	400	Thurber needlegrass-----------	15
				Wright buckwheat--------------	10
Vansickle---------	Shallow Cobbly Loam, MAP 14-16 (21e).	Favorable	600	Bluebunch wheatgrass----------	35
		Normal	400	Thurber needlegrass-----------	20
		Unfavorable	300	Low sagebrush-----------------	15
205:					
Jellycamp----------	Shallow Cool Very Stony Loam, MAP 16-18 (21e).	Favorable	600	Low sagebrush-----------------	20
		Normal	400	Idaho fescue------------------	20
		Unfavorable	300	Bluebunch wheatgrass----------	15
				Thurber needlegrass-----------	10
Vansickle---------	Shallow Cool Very Stony Loam, MAP 16-18 (21e).	Favorable	1,000	Low sagebrush-----------------	20
		Normal	800	Idaho fescue------------------	20
		Unfavorable	600	Bluebunch wheatgrass----------	15
				Thurber needlegrass-----------	10
206:					
Jellycamp----------	Shallow Very Stony Loam, MAP 14-18 (21e).	Favorable	600	Low sagebrush-----------------	20
		Normal	500	Bluebunch wheatgrass----------	15
		Unfavorable	400	Thurber needlegrass-----------	15
				Wright buckwheat--------------	10

Table 8.--Rangeland Productivity and Characteristic Plant Communities--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
206:					
Vansickle	Shallow Cobbly Loam, MAP 14-16 (21e).	Favorable	600	Bluebunch wheatgrass	35
		Normal	400	Thurber needlegrass	20
		Unfavorable	300	Low sagebrush	15
210:					
Karcal	Shallow Cobbly Clay, MAP 14-16 (21e).	Favorable	400	Low sagebrush	35
		Normal	300	Bluebunch wheatgrass	20
		Unfavorable	250	Nevada bluegrass	15
				Needlegrass	5
				Arrowleaf balsamroot	5
Cuppy	Cobbly Clay, MAP 14-16 (21e)	Favorable	1,300	Lemmon needlegrass	20
		Normal	1,000	Bluebunch wheatgrass	15
		Unfavorable	700	Bottlebrush squirreltail	15
				Mountain big sagebrush	10
				Mountain brome	10
				Rubber rabbitbrush	10
225:					
Lassen	Cobbly Clay, MAP 14-16 (21e)	Favorable	1,300	Lemmon needlegrass	20
		Normal	1,000	Bluebunch wheatgrass	15
		Unfavorable	700	Bottlebrush squirreltail	15
				Mountain big sagebrush	10
				Mountain brome	10
				Rubber rabbitbrush	10
				Idaho fescue	5
Cuppy	Cobbly Clay, MAP 14-16 (21e)	Favorable	1,300	Lemmon needlegrass	20
		Normal	1,000	Bluebunch wheatgrass	15
		Unfavorable	700	Bottlebrush squirreltail	15
				Mountain big sagebrush	10
				Mountain brome	10
				Rubber rabbitbrush	10
226 Lasvar	Clay Flat, MAP 18+ (22d)	Favorable	1,000	Yampa	75
		Normal	700	Danthonia	5
		Unfavorable	500	Bluegrass	5
227:					
Lasvar	Clay Flat, MAP 18+ (22d)	Favorable	1,000	Yampa	75
		Normal	700	Danthonia	5
		Unfavorable	500	Bluegrass	5
Pitvar	Clay Flat, MAP 18+ (22d)	Favorable	1,000	Yampa	75
		Normal	700	Carex	10
		Unfavorable	500	Rush	10
				Danthonia	5
				Bluegrass	5
235:					
Longcreek	Stony Loam, MAP 14-18 (21e)	Favorable	900	Bluebunch wheatgrass	40
		Normal	700	Thurber needlegrass	15
		Unfavorable	500	Mountain big sagebrush	15
				Antelope bitterbrush	5
				Basin wildrye	5
Vansickle	Shallow Cobbly Loam, MAP 14-16 (21e).	Favorable	600	Bluebunch wheatgrass	35
		Normal	400	Thurber needlegrass	20
		Unfavorable	300	Low sagebrush	15

Table 8.--Rangeland Productivity and Characteristic Plant Communities--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
235:					
Rock outcrop.					
236:					
Lonkey	Diatomaceous Loam, MAP 14-16 (21e).	Favorable	2,400	Basin wildrye	40
		Normal	2,000	Mountain big sagebrush	10
		Unfavorable	1,600	Bluebunch wheatgrass	10
				Rubber rabbitbrush	10
Datom	Diatomaceous Loam, MAP 14-16 (21e).	Favorable	2,400	Basin wildrye	40
		Normal	2,000	Bluebunch wheatgrass	10
		Unfavorable	1,600	Rubber rabbitbrush	10
				Mountain big sagebrush	10
237, 238:					
Lonkey	Cobbly Sandy Loam, MAP 16-18 (21e).	Favorable	1,800	Bluebunch wheatgrass	25
		Normal	1,400	Idaho fescue	15
		Unfavorable	1,000	Mountain big sagebrush	10
				Antelope bitterbrush	10
Malinda	Gravelly Loam, MAP 14-18 (21e)	Favorable	1,100	Idaho fescue	15
		Normal	900	Thurber needlegrass	10
		Unfavorable	700	Mountain big sagebrush	10
				Antelope bitterbrush	10
239:					
Lonkey	Cool Cobbly Loam, MAP 16-18 (21e).	Favorable	2,000	Idaho fescue	25
		Normal	1,600	Bluebunch wheatgrass	15
		Unfavorable	1,200	Mountain big sagebrush	10
				Antelope bitterbrush	10
Malinda	Gravelly Loam, MAP 14-18 (21e)	Favorable	1,100	Idaho fescue	15
		Normal	900	Thurber needlegrass	10
		Unfavorable	700	Mountain big sagebrush	10
				Antelope bitterbrush	10
243, 244, 245, 246- Malinda	Gravelly Loam, MAP 14-18 (21e)	Favorable	1,100	Idaho fescue	15
		Normal	900	Thurber needlegrass	10
		Unfavorable	700	Mountain big sagebrush	10
				Antelope bitterbrush	10
252, 253 Modoc	Loam, MAP 14-16 (21e)	Favorable	1,800	Basin wildrye	40
		Normal	1,500	Beardless wildrye	10
		Unfavorable	1,200	Basin big sagebrush	10
				Bluebunch wheatgrass	5
				Thurber needlegrass	5
				Bottlebrush squirreltail	5
270:					
Oxendine	Shallow Cobbly Loam, MAP 14-16 (21e).	Favorable	1,000	Bluebunch wheatgrass	35
		Normal	800	Thurber needlegrass	20
		Unfavorable	600	Low sagebrush	15
Lonkey	Diatomaceous Loam, MAP 14-16 (21e).	Favorable	2,400	Basin wildrye	40
		Normal	2,000	Mountain big sagebrush	10
		Unfavorable	1,600	Bluebunch wheatgrass	10
				Rubber rabbitbrush	10

Table 8.--Rangeland Productivity and Characteristic Plant Communities--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
271:					
Oxendine	Shallow Gravelly Loam, MAP 14-16 (21e).	Favorable	1,000	Needlegrass	30
		Normal	800	Bottlebrush squirreltail	20
		Unfavorable	600	Low sagebrush	15
Sweagert	Loamy Mounds, MAP 14-16 (21e)	Favorable	1,400	Needlegrass	30
		Normal	1,000	Bluebunch wheatgrass	20
		Unfavorable	800	Low sagebrush	15
272:					
Oxendine	Shallow Gravelly Loam, MAP 14-16 (21e).	Favorable	1,000	Needlegrass	30
		Normal	800	Bottlebrush squirreltail	20
		Unfavorable	600	Low sagebrush	15
Sweagert	Loamy Mounds, MAP 14-16 (21e)	Favorable	1,400	Needlegrass	30
		Normal	1,000	Bluebunch wheatgrass	20
		Unfavorable	800	Low sagebrush	15
273:					
Oxendine	Shallow Cobbly Loam, MAP 14-16 (21e).	Favorable	1,000	Bluebunch wheatgrass	35
		Normal	800	Thurber needlegrass	20
		Unfavorable	600	Low sagebrush	15
Sweagert	Loamy Mounds, MAP 14-16 (21e)	Favorable	1,400	Needlegrass	30
		Normal	1,000	Bluebunch wheatgrass	20
		Unfavorable	800	Low sagebrush	15
277, 278 Patburn	Loamy Fan, MAP 18+ (22d)	Favorable	2,500	Bluegrass	25
		Normal	2,000	Beardless wildrye	20
		Unfavorable	1,400	Silver sagebrush	15
				Meadow barley	5
290 Ravendale	Clay Basin, MAP 14-18 (21e)	Favorable	1,700	Nevada bluegrass	45
		Normal	1,500	Silver sagebrush	20
		Unfavorable	1,200		
292:					
Ricketts	Cobbly Loam, MAP 14-16 (21e)	Favorable	1,400	Lemmon needlegrass	45
		Normal	1,200	Rubber rabbitbrush	15
		Unfavorable	1,000	Bluebunch wheatgrass	10
				Mountain big sagebrush	10
Orhood	Stony Loam, MAP 14-18 (21e)	Favorable	1,100	Bluebunch wheatgrass	25
		Normal	700	Thurber needlegrass	20
		Unfavorable	400	Mountain big sagebrush	10
				Rubber rabbitbrush	10
293:					
Ricketts	Cobbly Loam, MAP 14-16 (21e)	Favorable	1,400	Bluebunch wheatgrass	25
		Normal	1,200	Thurber needlegrass	20
		Unfavorable	1,000	Mountain big sagebrush	10
				Rubber rabbitbrush	10
				Idaho fescue	5
Orhood	Stony Loam, MAP 14-18 (21e)	Favorable	1,100	Bluebunch wheatgrass	25
		Normal	700	Thurber needlegrass	20
		Unfavorable	400	Mountain big sagebrush	10
				Rubber rabbitbrush	10

Table 8.--Rangeland Productivity and Characteristic Plant Communities--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
294:					
Ricketts	Stony Loam, MAP 14-18 (21e)	Favorable	1,400	Bluebunch wheatgrass	25
		Normal	1,200	Thurber needlegrass	20
		Unfavorable	1,000	Mountain big sagebrush	10
				Rubber rabbitbrush	10
				Idaho fescue	5
Orhood	Stony Loam, MAP 14-18 (21e)	Favorable	1,100	Bluebunch wheatgrass	25
		Normal	700	Thurber needlegrass	20
		Unfavorable	400	Mountain big sagebrush	10
				Rubber rabbitbrush	10
295:					
Ricketts	Loamy Upland, MAP 20+ (22e)	Favorable	2,000	Lemmon needlegrass	50
		Normal	1,800	Mountain big sagebrush	25
		Unfavorable	1,600	Mountain brome	5
				Little oniongrass	5
Sweagert	Loamy Upland, MAP 20+ (22e)	Favorable	1,600	Lemmon needlegrass	50
		Normal	1,200	Mountain big sagebrush	25
		Unfavorable	1,000	Mountain brome	5
				Little oniongrass	5
296:					
Ricketts	Cool Cobbly Loam, MAP 16-18 (21e).	Favorable	1,400	Idaho fescue	25
		Normal	1,200	Bluebunch wheatgrass	15
		Unfavorable	1,000	Mountain big sagebrush	10
				Antelope bitterbrush	10
Searvar	Cool Cobbly Loam, MAP 16-18 (21e).	Favorable	2,000	Idaho fescue	25
		Normal	1,600	Bluebunch wheatgrass	15
		Unfavorable	1,200	Mountain big sagebrush	10
				Antelope bitterbrush	10
316:					
Stukel gravelly sandy loam	Shallow Sandy Loam, MAP 14-16 (21e).	Favorable	600	Needleandthread	15
		Normal	500	Thurber needlegrass	15
		Unfavorable	400	Mountain big sagebrush	15
				Indian ricegrass	10
				Antelope bitterbrush	10
Stukel very cobbly sandy loam	Shallow Cobbly Sandy Loam, MAP 14-16 (21e).	Favorable	1,000	Thurber needlegrass	15
		Normal	900	Rubber rabbitbrush	15
		Unfavorable	700	Indian ricegrass	15
				Mountain big sagebrush	10
319: Sweagert	Loamy Mounds, MAP 14-16 (21e)	Favorable	1,400	Needlegrass	30
		Normal	1,000	Bluebunch wheatgrass	20
		Unfavorable	800	Low sagebrush	15

Table 9.--Woodland Management and Productivity

(Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Ordination symbol	Commonly grown trees	Potential productivity		Equipment limitation	Seedling mortality	Plant competition	Hazard of soil damage from--	
			Site index	Site range				Fire	Compaction
109:									
Blankout----------	6S	Ponderosa pine------	92	76-107	Slight--	Slight---	Severe--	Slight--	Moderate
		White fir----------	67	54-75					
		Sugar pine---------	---	---					
		Incense-cedar-------	---	---					
Medici------------	6S	Ponderosa pine------	89	71-110	Slight--	Slight---	Severe--	Slight--	Moderate
		White fir----------	75	60-90					
		Sugar pine---------	---	---					
		Incense-cedar-------	---	---					
110:									
Boardburn----------	4A	Jeffrey pine and ponderosa pine-----	71	67-83	Slight--	Slight---	Severe--	Slight--	Severe--
		Incense-cedar-------	---	---					
		California black oak	---	---					
		Sugar pine---------	---	---					
		White fir----------	---	---					
Hambone-----------	4F	Ponderosa pine------	75	63-88	Slight--	Moderate	Moderate	Moderate	Severe--
		White fir----------	51	39-70					
		Douglas-fir---------	89	82-98					
		Incense-cedar-------	---	---					
		Sugar pine---------	---	---					
111----------------- Bollibokka	3D	Ponderosa pine------	64	54-77	Slight--	Severe---	Moderate	Slight--	Severe--
		Digger pine---------	---	---					
		Western juniper-----	---	---					
		California black oak	---	---					
		Oregon white oak----	---	---					
112----------------- Bollibokka	3R	Ponderosa pine------	64	54-77	Moderate	Severe---	Moderate	Moderate	Severe--
		Oregon white oak----	---	---					
		Western juniper-----	---	---					
		California black oak	---	---					
		Digger pine---------	---	---					
113----------------- Bollibokka	3R	Ponderosa pine------	64	54-77	Severe--	Severe---	Moderate	Moderate	Severe--
		California black oak	---	---					
		Oregon white oak----	---	---					
		Western juniper-----	---	---					
		Digger pine---------	---	---					

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Commonly grown trees	Potential productivity: Site index	Potential productivity: Site range	Equipment limitation	Seedling mortality	Plant competition	Hazard of soil damage from--: Fire	Hazard of soil damage from--: Compaction	
114, 115. Britton	5D	Ponderosa pine	82	72-88	Slight	Slight	Moderate	Slight	Moderate	S
		California black oak	---	---						
		Oregon white oak	---	---						
116. Britton	5R	Ponderosa pine	82	72-88	Moderate	Slight	Moderate	Slight	Moderate	S
		Oregon white oak	---	---						
		California black oak	---	---						
117:										
Bundora	14A	White fir	83	82-84	Slight	Slight	Severe	Moderate	Slight	S
		Ponderosa pine	---	---						
		Sugar pine	---	---						
Goulder	13F	White fir	76	61-84	Slight	Slight	Severe	Slight	Moderate	S
		Incense-cedar	---	---						
		Sugar pine	---	---						
		Ponderosa pine	---	---						
		Douglas-fir	---	---						
		California black oak	---	---						
		California red fir	---	---						
118:										
Bundora	14A	White fir	83	82-84	Slight	Slight	Severe	Moderate	Slight	S
		Sugar pine	---	---						
		Ponderosa pine	---	---						
Goulder	13F	White fir	76	61-84	Slight	Slight	Severe	Slight	Moderate	S
		Incense-cedar	---	---						
		California red fir	---	---						
		Ponderosa pine	---	---						
		Douglas-fir	---	---						
		California black oak	---	---						
		Sugar pine	---	---						
119:										
Bundora	14R	White fir	83	82-84	Moderate	Slight	Severe	Moderate	Slight	S
		Ponderosa pine	---	---						
		Sugar pine	---	---						
Goulder	13R	White fir	76	61-84	Moderate	Slight	Severe	Moderate	Moderate	S
		Sugar pine	---	---						
		California red fir	---	---						
		California black oak	---	---						
		Douglas-fir	---	---						
		Incense-cedar	---	---						
		Ponderosa pine	---	---						

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Commonly grown trees	Potential productivity		Equipment limitation	Seedling mortality	Plant competition	Hazard of soil damage from--		
			Site index	Site range				Fire	Compaction	
122:										
Burney------------	5A	Ponderosa pine------	80	71-96	Slight--	Slight---	Moderate	Slight--	Moderate	S
		California black oak	---	---						
		Incense-cedar-------	---	---						
		Oregon white oak----	---	---						
Arkright----------	4F	Ponderosa pine------	69	60-80	Slight--	Moderate	Moderate	Slight--	Moderate	M
		Oregon white oak----	---	---						
		California black oak	---	---						
123:										
Canyoncreek--------	6F	White fir----------	49	40-58	Slight--	Slight---	Severe--	Slight--	Moderate	S
		Jeffrey pine and ponderosa pine-----	---	---						
Hermit------------	6A	White fir----------	50	43-60	Slight--	Slight---	Severe--	Slight--	Moderate	S
		Jeffrey pine and ponderosa pine-----	---	---						
		Incense-cedar-------	---	---						
124:										
Canyoncreek--------	6R	White fir----------	49	40-58	Moderate	Slight---	Severe--	Moderate	Moderate	S
		Jeffrey pine and ponderosa pine-----	---	---						
Hermit------------	6R	White fir----------	50	43-60	Moderate	Slight---	Severe--	Moderate	Moderate	S
		Jeffrey pine and ponderosa pine-----	---	---						
		Incense-cedar-------	---	---						
125, 126----------- Carberry	10F	White fir----------	66	57-73	Slight--	Slight---	Severe--	Slight--	Moderate	S
		Douglas-fir---------	---	---						
		Ponderosa pine------	---	---						
		Sugar pine----------	---	---						
		Incense-cedar-------	---	---						
127---------------- Carberry	10R	White fir----------	66	57-73	Moderate	Slight---	Severe--	Moderate	Moderate	S
		Sugar pine----------	---	---						
		Incense-cedar-------	---	---						
		Douglas-fir---------	---	---						
		Ponderosa pine------	---	---						
128:										
Carberry----------	10F	White fir----------	66	57-73	Slight--	Slight---	Severe--	Slight--	Moderate	S
		Incense-cedar-------	---	---						
		Sugar pine----------	---	---						
		Ponderosa pine------	---	---						

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Commonly grown trees	Potential productivity		Equipment limitation	Seedling mortality	Plant competition	Hazard of soil damage from--		
			Site index	Site range				Fire	Compaction	
128:										
Ponto	15A	White fir	87	81-90	Slight	Slight	Severe	Slight	Slight	S
		Ponderosa pine	137	130-140						
		Incense-cedar	---	---						
		Sugar pine	---	---						
		Douglas-fir	---	---						
129:										
Carberry	10F	White fir	66	57-73	Slight	Slight	Severe	Slight	Moderate	S
		Douglas-fir	---	---						
		Ponderosa pine	---	---						
		Sugar pine	---	---						
		Incense-cedar	---	---						
		California black oak	---	---						
Ponto	15A	White fir	87	81-90	Slight	Slight	Severe	Slight	Slight	S
		Ponderosa pine	137	130-140						
		Sugar pine	---	---						
		Incense-cedar	---	---						
		Douglas-fir	---	---						
130:										
Carberry	10F	White fir	66	57-73	Slight	Slight	Severe	Slight	Moderate	S
		Douglas-fir	---	---						
		California black oak	---	---						
		Incense-cedar	---	---						
		Sugar pine	---	---						
		Ponderosa pine	---	---						
Lava flows.										
132:										
Chatterdown	9A	Ponderosa pine	113	105-119	Slight	Slight	Severe	Slight	Slight	S
		White fir	---	---						
		Incense-cedar	---	---						
Nikal	7A	Ponderosa pine	101	88-111	Slight	Slight	Severe	Slight	Moderate	S
		Incense-cedar	---	---						
		Lodgepole pine	---	---						
		White fir	---	---						
133:										
Chirpchatter	4S	Jeffrey pine and ponderosa pine	75	63-84	Slight	Slight	Moderate	Slight	Severe	S
		Incense-cedar	---	---						
		California black oak	---	---						
		Oregon white oak	---	---						

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Commonly grown trees	Potential productivity		Equipment limitation	Seedling mortality	Plant competition	Hazard of soil damage from--		
			Site index	Site range				Fire	Compaction	
133:										
Hunsinger	4F	Jeffrey pine and ponderosa pine	75	70-82	Slight	Severe	Moderate	Slight	Moderate	S
		Incense-cedar	---	---						
		California black oak	---	---						
134 Coneward	4S	Ponderosa pine	77	58-91	Slight	Severe	Moderate	Moderate	Severe	S
		Digger pine	---	---						
		Western juniper	---	---						
		Oregon white oak	---	---						
135 Coneward	4S	Ponderosa pine	77	58-91	Slight	Severe	Slight	Moderate	Severe	S
		Digger pine	---	---						
		Western juniper	---	---						
		Oregon white oak	---	---						
136 Coneward	4R	Ponderosa pine	77	58-91	Moderate	Severe	Slight	Moderate	Severe	S
		Digger pine	---	---						
		Western juniper	---	---						
		Oregon white oak	---	---						
137:										
Coneward	4S	Ponderosa pine	77	58-91	Slight	Severe	Moderate	Moderate	Severe	S
		Digger pine	---	---						
		Western juniper	---	---						
		Oregon white oak	---	---						
Lava flows.										
139 Danhunt	13F	White fir	79	72-85	Slight	Slight	Severe	Slight	Slight	S
		Ponderosa pine	---	---						
		California red fir	---	---						
		Sugar pine	---	---						
		Douglas-fir	---	---						
140 Danhunt	13R	White fir	79	72-85	Moderate	Slight	Severe	Moderate	Slight	S
		Sugar pine	---	---						
		California red fir	---	---						
		Douglas-fir	---	---						
		Ponderosa pine	---	---						
141 Danhunt	13R	White fir	79	72-85	Severe	Slight	Severe	Moderate	Slight	S
		Sugar pine	---	---						
		California red fir	---	---						
		Douglas-fir	---	---						
		Ponderosa pine	---	---						

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Commonly grown trees	Potential productivity: Site index	Potential productivity: Site range	Equipment limitation	Seedling mortality	Plant competition	Hazard of soil damage from--: Fire	Hazard of soil damage from--: Compaction	
144----------------- Dekkas	10S	White fir----------	64	53-79	Slight--	Slight---	Moderate	Slight--	Slight--	Sl
		Ponderosa pine and Jeffrey pine-------	108	107-108						
		Lodgepole pine------	---	---						
145----------------- Depner	10F	White fir----------	66	52-86	Slight--	Slight---	Severe--	Slight--	Slight--	Sl
		Douglas-fir---------	116	110-119						
		Ponderosa pine------	---	---						
		Incense-cedar-------	---	---						
		Sugar pine----------	---	---						
		California black oak	---	---						
146----------------- Depner	10R	White fir----------	66	52-86	Moderate	Slight---	Severe--	Moderate	Slight--	Sl
		Douglas-fir---------	116	110-119						
		Incense-cedar-------	---	---						
		Ponderosa pine------	---	---						
		Sugar pine----------	---	---						
		California black oak	---	---						
164: Etsel.										
Neuns--------------	8R	Ponderosa pine------	103	87-134	Severe--	Severe---	Moderate	Moderate	Slight--	Mo
		Douglas-fir---------	100	80-130						
		Incense-cedar-------	---	---						
		Sugar pine----------	---	---						
		California black oak	---	---						
165: Fiddler-----------	1X	Western juniper-----	20	19-23	Moderate	Moderate	Moderate	Slight--	Severe--	Mo
Deven.										
166: Fiddler-----------	1R	Western juniper-----	20	19-23	Severe--	Moderate	Moderate	Moderate	Severe--	Se
Deven.										
167: Fiddler-----------	1X	Western juniper-----	20	19-23	Slight--	Moderate	Moderate	Slight--	Severe--	Mo
Whitinger----------	2X	Western juniper-----	25	20-35	Severe--	Moderate	Moderate	Slight--	Severe--	Mo
168: Fiddler-----------	1X	Western juniper-----	20	19-23	Slight--	Moderate	Moderate	Slight--	Severe--	Mo

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordi- nation symbol	Commonly grown trees	Potential productivity		Equip- ment limita- tion	Seedling mortality	Plant competi- tion	Hazard of soil damage from--		
			Site index	Site range				Fire	Compac- tion	
168:										
Whitinger----------	2X	Western juniper-----	25	20-35	Severe--	Moderate	Moderate	Slight--	Severe--	M
169:										
Gardens.										
Jacksback----------	5W	Lodgepole pine------	86	71-92	Slight--	Slight---	Severe--	Slight--	Severe--	S
		White fir-----------	---	---						
		Quaking aspen-------	---	---						
170:										
Gasper-------------	8F	Jeffrey pine and ponderosa pine-----	108	101-118	Slight--	Slight---	Severe--	Moderate	Moderate	S
		Incense-cedar-------	---	---						
		Sugar pine----------	---	---						
		White fir-----------	---	---						
Scarface-----------	7A	Jeffrey pine and ponderosa pine-----	97	85-108	Slight--	Slight---	Severe--	Slight--	Moderate	S
		Incense-cedar-------	---	---						
		Sugar pine----------	---	---						
		White fir-----------	---	---						
171:										
Gasper-------------	8R	Jeffrey pine and ponderosa pine-----	108	101-118	Moderate	Slight---	Severe--	Moderate	Moderate	S
		Incense-cedar-------	---	---						
		Sugar pine----------	---	---						
		White fir-----------	---	---						
Scarface-----------	7R	Jeffrey pine and ponderosa pine-----	97	85-108	Moderate	Slight---	Severe--	Moderate	Moderate	S
		Incense-cedar-------	---	---						
		Sugar pine----------	---	---						
		White fir-----------	---	---						
172, 173:										
Gasper-------------	10F	White fir-----------	63	59-66	Slight--	Slight---	Moderate	Slight--	Moderate	S
		Sugar pine----------	---	---						
		California black oak	---	---						
		Douglas-fir---------	---	---						
		Incense-cedar-------	---	---						
		Ponderosa pine------	---	---						

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Commonly grown trees	Potential productivity		Equipment limitation	Seedling mortality	Plant competition	Hazard of soil damage from--		
			Site index	Site range				Fire	Compaction	
172, 173:										
Scarface	9A	White fir	62	54-69	Slight	Slight	Severe	Slight	Moderate	S
		Douglas-fir	103	87-118						
		California black oak	---	---						
		Sugar pine	---	---						
		Incense-cedar	---	---						
		Ponderosa pine	---	---						
174:										
Gasper	10R	White fir	63	59-66	Moderate	Slight	Moderate	Moderate	Moderate	S
		Sugar pine	---	---						
		Incense-cedar	---	---						
		Douglas-fir	---	---						
		Ponderosa pine	---	---						
		California black oak	---	---						
Scarface	9R	White fir	62	54-69	Moderate	Slight	Severe	Moderate	Moderate	S
		Douglas-fir	103	87-118						
		Incense-cedar	---	---						
		Sugar pine	---	---						
		Ponderosa pine	---	---						
		California black oak	---	---						
176	4X	Jeffrey pine and								
Gosch		ponderosa pine	76	63-92	Moderate	Slight	Moderate	Moderate	Moderate	S
		White fir	50	41-72						
		Incense-cedar	---	---						
177:										
Gosch	6R	Jeffrey pine and								
		ponderosa pine	76	63-92	Moderate	Moderate	Moderate	Moderate	Moderate	S
		White fir	50	41-72						
		Incense-cedar	---	---						
Witcher	5R	Jeffrey pine and								
		ponderosa pine	79	59-96	Moderate	Slight	Severe	Moderate	Moderate	S
		White fir	43	33-58						
		Incense-cedar	---	---						
178, 179	13F	White fir	76	61-84	Slight	Slight	Severe	Slight	Moderate	S
Goulder		California black oak	---	---						
		California red fir	---	---						
		Incense-cedar	---	---						
		Sugar pine	---	---						
		Ponderosa pine	---	---						
		Douglas-fir	---	---						

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Commonly grown trees	Potential productivity: Site index	Potential productivity: Site range	Equipment limitation	Seedling mortality	Plant competition	Hazard of soil damage from--: Fire	Hazard of soil damage from--: Compaction	
180----------------- Goulder	13R	White fir-----------	76	61-84	Moderate	Slight---	Severe--	Moderate	Moderate	S
		Ponderosa pine------	---	---						
		California red fir--	---	---						
		Incense-cedar-------	---	---						
		Sugar pine----------	---	---						
		California black oak	---	---						
		Douglas-fir---------	---	---						
181: Gullied land.										
Rock outcrop.										
Mounthat-----------	11R	White fir-----------	69	58-83	Severe--	Slight---	Severe--	Moderate	Slight--	S
		Ponderosa pine------	---	---						
		Sugar pine----------	---	---						
		Incense-cedar-------	---	---						
		California black oak	---	---						
182: Hambone------------	4F	Jeffrey pine and ponderosa pine-----	75	63-88	Slight--	Moderate	Moderate	Moderate	Severe--	S
		White fir-----------	51	39-70						
		Douglas-fir---------	89	82-98						
		Incense-cedar-------	---	---						
		Sugar pine----------	---	---						
Boardburn----------	4A	Ponderosa pine------	71	67-83	Slight--	Slight---	Severe--	Slight--	Severe--	S
		Sugar pine----------	---	---						
		White fir-----------	---	---						
		California black oak	---	---						
		Incense-cedar-------	---	---						
183: Hambone------------	4R	Jeffrey pine and ponderosa pine-----	75	63-88	Moderate	Moderate	Moderate	Moderate	Severe--	S
		White fir-----------	51	39-70						
		Douglas-fir---------	89	82-98						
		Incense-cedar-------	---	---						
		Sugar pine----------	---	---						
Boardburn----------	4R	Ponderosa pine------	71	67-83	Moderate	Slight---	Severe--	Moderate	Severe--	S
		White fir-----------	---	---						
		California black oak	---	---						
		Incense-cedar-------	---	---						
		Sugar pine----------	---	---						

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Commonly grown trees	Potential productivity: Site index	Potential productivity: Site range	Equipment limitation	Seedling mortality	Plant competition	Hazard of soil damage from--: Fire	Hazard of soil damage from--: Compaction	
186:										
Hermit	6A	White fir	50	43-60	Slight	Slight	Severe	Slight	Moderate	S
		Jeffrey pine and ponderosa pine	---	---						
Canyoncreek	6F	White fir	49	40-58	Slight	Slight	Severe	Slight	Moderate	S
		Jeffrey pine and ponderosa pine	---	---						
187:										
Hunsinger	4F	Jeffrey pine and ponderosa pine	75	70-82	Slight	Severe	Moderate	Slight	Moderate	S
		California black oak	---	---						
		Incense-cedar	---	---						
Chirpchatter	4S	Jeffrey pine and ponderosa pine	75	63-84	Slight	Slight	Moderate	Slight	Severe	S
		Incense-cedar	---	---						
		California black oak	---	---						
		Oregon white oak	---	---						
188:										
Hunsinger	4F	Jeffrey pine and ponderosa pine	75	70-82	Slight	Severe	Moderate	Slight	Moderate	S
		California black oak	---	---						
		Incense-cedar	---	---						
Chirpchatter	4S	Jeffrey pine and ponderosa pine	75	63-84	Slight	Severe	Moderate	Slight	Severe	S
		Oregon white oak	---	---						
		California black oak	---	---						
		Incense-cedar	---	---						
189:										
Hunsinger	4R	Jeffrey pine and ponderosa pine	75	70-82	Moderate	Moderate	Moderate	Moderate	Moderate	S
		California black oak	---	---						
		Incense-cedar	---	---						
Chirpchatter	4R	Jeffrey pine and ponderosa pine	75	63-84	Moderate	Slight	Moderate	Moderate	Severe	S
		Incense-cedar	---	---						
		California black oak	---	---						
		Oregon white oak	---	---						

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Commonly grown trees	Potential productivity: Site index	Potential productivity: Site range	Equipment limitation	Seedling mortality	Plant competition	Hazard of soil damage from--: Fire	Hazard of soil damage from--: Compaction	
190----------------- Jacksback	5W	Lodgepole pine------	86	71-92	Slight--	Slight---	Severe--	Slight--	Severe--	S
		Quaking aspen-------	---	---						
		White fir-----------	---	---						
191, 192------------ Jadpor	6F	Ponderosa pine------	93	88-99	Slight--	Severe---	Moderate	Moderate	Severe--	M
		Western juniper-----	---	---						
		California black oak	---	---						
		Oregon white oak----	---	---						
193: Jahjo.										
Lava flows.										
Loveness-----------	5A	Ponderosa pine------	82	73-94	Slight--	Slight---	Moderate	Slight--	Moderate	S
		White fir-----------	---	---						
		Incense-cedar-------	---	---						
194: Jellico-----------	3F	Ponderosa pine------	62	52-68	Slight--	Moderate	Moderate	Slight--	Severe--	M
		Western juniper-----	28	27-29						
		California black oak	---	---						
		Digger pine---------	---	---						
		Oregon white oak----	---	---						
Lava flows.										
195: Jellico-----------	3F	Ponderosa pine------	62	52-68	Slight--	Moderate	Moderate	Slight--	Severe--	M
		Western juniper-----	28	27-29						
		Digger pine---------	---	---						
		California black oak	---	---						
		Oregon white oak----	---	---						
Splawn.										
196: Jellico-----------	3R	Ponderosa pine------	62	52-68	Moderate	Moderate	Moderate	Moderate	Severe--	S
		Western juniper-----	28	27-29						
		California black oak	---	---						
		Oregon white oak----	---	---						
		Digger pine---------	---	---						
Splawn.										

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Commonly grown trees	Potential productivity: Site index	Potential productivity: Site range	Equipment limitation	Seedling mortality	Plant competition	Hazard of soil damage from--: Fire	Hazard of soil damage from--: Compaction	
207, 208:										
Jimmerson loam-----	6A	Ponderosa pine------	93	82-109	Slight--	Slight---	Severe--	Slight--	Moderate	S
		Douglas-fir---------	106	92-130						
		Incense-cedar-------	---	---						
		White fir-----------	---	---						
		Sugar pine----------	---	---						
Jimmerson stony sandy loam--------	7X	Ponderosa pine------	95	85-104	Moderate	Slight---	Severe--	Slight--	Moderate	S
		Douglas-fir---------	112	95-130						
		Incense-cedar-------	---	---						
		Sugar pine----------	---	---						
		White fir-----------	---	---						
209:										
Jimmerson stony loam-------------	7R	Douglas-fir---------	112	95-130	Moderate	Slight---	Severe--	Moderate	Moderate	S
		Ponderosa pine------	95	85-104						
		White fir-----------	---	---						
		Incense-cedar-------	---	---						
		Sugar pine----------	---	---						
Jimmerson loam-----	6R	Douglas-fir---------	106	92-130	Moderate	Slight---	Severe--	Moderate	Moderate	S
		Ponderosa pine------	93	82-109						
		Incense-cedar-------	---	---						
		Sugar pine----------	---	---						
		White fir-----------	---	---						
214:										
Kephart-----------	6F	Ponderosa pine------	91	75-106	Slight--	Slight---	Severe--	Moderate	Moderate	S
		Sugar pine----------	---	---						
		Incense-cedar-------	---	---						
		White fir-----------	---	---						
Quaking-----------	6S	Jeffrey pine and ponderosa pine-----	89	81-97	Slight--	Moderate	Moderate	Moderate	Moderate	S
		Incense-cedar-------	---	---						
215---------------- Kettlebelly	6A	Douglas-fir---------	106	80-120	Slight--	Slight---	Severe--	Slight--	Severe--	S
		Ponderosa pine------	118	99-140						
		Sugar pine----------	---	---						
		Incense-cedar-------	---	---						
		White fir-----------	---	---						
		California black oak	---	---						

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordi- nation symbol	Commonly grown trees	Potential productivity: Site index	Potential productivity: Site range	Equip- ment limita- tion	Seedling mortality	Plant competi- tion	Hazard of soil damage from--: Fire	Hazard of soil damage from--: Compac- tion	
216:										
Kettlebelly--------	8A	Ponderosa pine------	108	96-120	Slight--	Slight---	Severe--	Slight--	Moderate	S
		Incense-cedar-------	---	---						
		Douglas-fir---------	---	---						
		California black oak	---	---						
Neuns-------------	8F	Ponderosa pine------	103	87-134	Slight--	Severe---	Moderate	Slight--	Slight--	M
		Douglas-fir---------	100	80-130						
		Sugar pine----------	---	---						
		California black oak	---	---						
217:										
Kettlebelly--------	8R	Ponderosa pine------	108	96-120	Moderate	Slight---	Severe--	Slight--	Moderate	S
		Incense-cedar-------	---	---						
		Douglas-fir---------	---	---						
		California black oak	---	---						
Neuns-------------	8R	Ponderosa pine------	103	87-134	Moderate	Severe---	Moderate	Moderate	Slight--	M
		Douglas-fir---------	100	80-130						
		Sugar pine----------	---	---						
		California black oak	---	---						
218:										
Kettlebelly--------	6A	Douglas-fir---------	106	80-120	Slight--	Slight---	Severe--	Slight--	Severe--	S
		Ponderosa pine------	118	99-140						
		White fir-----------	---	---						
		Sugar pine----------	---	---						
		Incense-cedar-------	---	---						
		California black oak	---	---						
Neuns-------------	8F	Ponderosa pine------	103	87-134	Slight--	Severe---	Moderate	Slight--	Slight--	M
		Douglas-fir---------	100	80-130						
		Sugar pine----------	---	---						
		California black oak	---	---						
219:										
Kettlebelly--------	6R	Douglas-fir---------	106	80-120	Moderate	Slight---	Severe--	Slight--	Severe--	S
		Ponderosa pine------	118	99-140						
		White fir-----------	---	---						
		California black oak	---	---						
		Incense-cedar-------	---	---						
		Sugar pine----------	---	---						

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Commonly grown trees	Potential productivity: Site index	Potential productivity: Site range	Equipment limitation	Seedling mortality	Plant competition	Hazard of soil damage from--: Fire	Hazard of soil damage from--: Compaction	
219:										
Neuns	8R	Ponderosa pine	103	87-134	Moderate	Severe	Moderate	Moderate	Slight	M
		Douglas-fir	100	80-130						
		Sugar pine	---	---						
		California black oak	---	---						
220, 221: Kilarc	1D	Interior live oak	---	---	Moderate	Severe	Severe	Slight	Moderate	S
		Oregon white oak	---	---						
		Incense-cedar	---	---						
		California black oak	---	---						
		Digger pine	---	---						
		Blue oak	---	---						
222: Kilarc	1D	Incense-cedar	---	---	Severe	Severe	Severe	Slight	Moderate	S
		Oregon white oak	---	---						
		Digger pine	---	---						
		Interior live oak	---	---						
		Blue oak	---	---						
223:										
Kindig	7F	Douglas-fir	110	99-124	Slight	Severe	Moderate	Slight	Moderate	S
		Ponderosa pine	89	87-91						
		White fir	52	52						
		Sugar pine	---	---						
		Incense-cedar	---	---						
		California black oak	---	---						
Neuns	8F	Ponderosa pine	103	87-134	Slight	Severe	Moderate	Slight	Moderate	M
		Douglas-fir	100	80-130						
		Sugar pine	---	---						
		California black oak	---	---						
		White fir	---	---						
224:										
Kindig	7R	Douglas-fir	110	99-124	Moderate	Severe	Moderate	Moderate	Moderate	S
		Ponderosa pine	89	87-91						
		White fir	52	52						
		Incense-cedar	---	---						
		California black oak	---	---						
		Sugar pine	---	---						
Neuns	8R	Ponderosa pine	103	87-134	Moderate	Severe	Moderate	Moderate	Moderate	M
		Douglas-fir	100	80-130						
		Sugar pine	---	---						
		White fir	---	---						
		California black oak	---	---						

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Commonly grown trees	Potential productivity: Site index	Potential productivity: Site range	Equipment limitation	Seedling mortality	Plant competition	Hazard of soil damage from--: Fire	Hazard of soil damage from--: Compaction	
229:										
Lava flows.										
Gassaway	4F	Ponderosa pine	68	53-77	Slight	Severe	Moderate	Slight	Severe	M
		Western juniper	---	---						
		Oregon white oak	---	---						
		Modoc cypress	---	---						
		California black oak	---	---						
230:										
Lava flows.										
Neer	4X	Ponderosa pine	71	61-81	Slight	Slight	Severe	Slight	Slight	S
		Incense-cedar	---	---						
231 Longbell	5S	Ponderosa pine	85	77-95	Slight	Moderate	Moderate	Slight	Severe	S
232:										
Longbell	5S	Ponderosa pine	85	77-95	Slight	Moderate	Moderate	Slight	Severe	S
Lava flows.										
240, 241:										
Loveness	5A	Ponderosa pine	82	73-94	Slight	Slight	Moderate	Slight	Moderate	S
		White fir	---	---						
		Incense-cedar	---	---						
Fleener	5F	Ponderosa pine	83	73-94	Slight	Moderate	Moderate	Slight	Moderate	S
		White fir	---	---						
		Incense-cedar	---	---						
249:										
Medici	6S	Ponderosa pine	89	71-110	Slight	Slight	Severe	Slight	Moderate	S
		White fir	75	60-90						
		Sugar pine	---	---						
		Incense-cedar	---	---						
Blankout	6S	Ponderosa pine	92	76-107	Slight	Slight	Severe	Slight	Moderate	S
		White fir	67	54-75						
		Sugar pine	---	---						
		Incense-cedar	---	---						

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordi-nation symbol	Commonly grown trees	Potential productivity		Equip-ment limita-tion	Seedling mortality	Plant competi-tion	Hazard of soil damage from--		
			Site index	Site range				Fire	Compac-tion	
250----------------- Medlake	5S	Jeffrey pine and ponderosa pine-----	81	71-90	Slight--	Slight---	Moderate	Slight--	Slight--	S
		White fir----------	55	50-60						
		Sugar pine----------	---	---						
		Incense-cedar-------	---	---						
251----------------- Medlake	5S	Jeffrey pine and ponderosa pine-----	81	71-90	Slight--	Slight---	Moderate	Slight--	Slight--	S
		White fir----------	55	50-60						
		Incense-cedar-------	---	---						
		Sugar pine----------	---	---						
254: Mounthat-----------	11R	White fir----------	69	58-83	Severe--	Slight---	Severe--	Moderate	Slight--	S
		Sugar pine----------	---	---						
		Ponderosa pine------	---	---						
		California black oak	---	---						
		Incense-cedar-------	---	---						
Rock outcrop.										
255----------------- Murken	3X	Ponderosa pine------	63	---	Moderate	Moderate	Slight--	Slight--	Slight--	M
		Oregon white oak----	---	---						
		Digger pine---------	---	---						
256----------------- Nanny	7F	Ponderosa pine------	96	88-107	Slight--	Slight---	Moderate	Slight--	Moderate	S
		Lodgepole pine------	---	---						
		Sugar pine----------	---	---						
		Knobcone pine-------	---	---						
		White fir----------	---	---						
257----------------- Neer	13R	White fir----------	78	70-86	Severe--	Slight---	Severe--	Moderate	Slight--	S
		Incense-cedar-------	---	---						
		Sugar pine----------	---	---						
		Ponderosa pine------	---	---						
		Douglas-fir---------	---	---						
		California black oak	---	---						
258: Neer---------------	13R	White fir----------	78	70-86	Moderate	Slight---	Severe--	Moderate	Slight--	S
		Ponderosa pine------	105	100-109						
		Sugar pine----------	---	---						
		Douglas-fir---------	---	---						
		Incense-cedar-------	---	---						
		California black oak	---	---						

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Commonly grown trees	Potential productivity		Equipment limitation	Seedling mortality	Plant competition	Hazard of soil damage from--		
			Site index	Site range				Fire	Compaction	
258:										
Ponto	15A	White fir	87	81-90	Moderate	Slight	Severe	Moderate	Slight	S
		Ponderosa pine	105	100-109						
		Sugar pine	---	---						
		Douglas-fir	---	---						
		Incense-cedar	---	---						
		California black oak	---	---						
259:										
Neer	13F	White fir	78	70-86	Slight	Slight	Severe	Slight	Slight	S
		Ponderosa pine	105	100-109						
		Douglas-fir	110	110						
		Incense-cedar	---	---						
		Sugar pine	---	---						
		California black oak	---	---						
Ponto	15A	White fir	87	81-90	Slight	Slight	Severe	Slight	Slight	S
		Ponderosa pine	137	130-140						
		Sugar pine	---	---						
		Incense-cedar	---	---						
		Douglas-fir	---	---						
260:										
Neer	13F	White fir	78	70-86	Moderate	Slight	Severe	Moderate	Slight	S
		Ponderosa pine	105	100-109						
		Douglas-fir	110	110						
		Incense-cedar	---	---						
		Sugar pine	---	---						
		California black oak	---	---						
Ponto	15A	White fir	87	81-90	Moderate	Slight	Severe	Moderate	Slight	S
		Ponderosa pine	137	130-140						
		Sugar pine	---	---						
		Incense-cedar	---	---						
		Douglas-fir	---	---						
261:										
Neuns	8R	Ponderosa pine	103	87-134	Severe	Severe	Moderate	Moderate	Slight	M
		Douglas-fir	100	80-130						
		California black oak	---	---						
		Incense-cedar	---	---						
		Sugar pine	---	---						

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Commonly grown trees	Potential productivity: Site index	Potential productivity: Site range	Equipment limitation	Seedling mortality	Plant competition	Hazard of soil damage from--: Fire	Hazard of soil damage from--: Compaction
261:									
Kettlebelly--------	6R	Douglas-fir---------	106	80-120	Severe--	Slight---	Severe--	Moderate	Severe--
		Ponderosa pine------	118	99-140					
		California black oak	---	---					
		Incense-cedar-------	---	---					
		White fir-----------	---	---					
		Sugar pine----------	---	---					
262:									
Neuns-------------	8R	Ponderosa pine------	103	87-134	Severe--	Severe---	Moderate	Moderate	Slight--
		Douglas-fir---------	100	80-130					
		Incense-cedar-------	---	---					
		Sugar pine----------	---	---					
		California black oak	---	---					
Kettlebelly--------	8R	Ponderosa pine------	108	96-120	Severe--	Slight---	Severe--	Moderate	Moderate
		Incense-cedar-------	---	---					
		Douglas-fir---------	---	---					
		California black oak	---	---					
263:									
Neuns-------------	8R	Ponderosa pine------	103	87-134	Severe--	Severe---	Moderate	Moderate	Moderate
		Douglas-fir---------	100	80-130					
		Sugar pine----------	---	---					
		California black oak	---	---					
		Incense-cedar-------	---	---					
Kindig------------	7R	White fir-----------	52	52	Severe--	Severe---	Moderate	Moderate	Moderate
		Ponderosa pine------	89	87-91					
		Douglas-fir---------	110	99-124					
		Incense-cedar-------	---	---					
		California black oak	---	---					
		Sugar pine----------	---	---					
264:									
Nikal-------------	7A	Ponderosa pine------	101	88-111	Slight--	Slight---	Severe--	Slight--	Moderate
		Lodgepole pine------	---	---					
		Incense-cedar-------	---	---					
		White fir-----------	---	---					
Chatterdown--------	9A	Ponderosa pine------	113	105-119	Slight--	Slight---	Severe--	Slight--	Slight--
		Incense-cedar-------	---	---					
		White fir-----------	---	---					
Lava flows.									

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordi-nation symbol	Commonly grown trees	Potential productivity		Equip-ment limita-tion	Seedling mortality	Plant competi-tion	Hazard of soil damage from--		
			Site index	Site range				Fire	Compac-tion	
266, 267:										
Obie	12F	White fir	71	63-78	Slight	Slight	Severe	Slight	Slight	S
		Incense-cedar	---	---						
		Ponderosa pine	---	---						
		California red fir	---	---						
		Sugar pine	---	---						
		California black oak	---	---						
Mounthat	11F	White fir	69	58-83	Slight	Slight	Severe	Slight	Slight	S
		Incense-cedar	---	---						
		Ponderosa pine	---	---						
		California red fir	---	---						
		Sugar pine	---	---						
		California black oak	---	---						
268:										
Obie	12R	White fir	71	63-78	Moderate	Slight	Severe	Moderate	Slight	S
		Sugar pine	---	---						
		California red fir	---	---						
		Incense-cedar	---	---						
Mounthat	11R	White fir	69	58-83	Moderate	Slight	Severe	Moderate	Slight	S
		California black oak	---	---						
		Incense-cedar	---	---						
		Ponderosa pine	---	---						
		Sugar pine	---	---						
286 Ponto	15A	White fir	87	81-90	Slight	Slight	Severe	Slight	Slight	S
		Ponderosa pine	137	130-140						
		Incense-cedar	---	---						
		Douglas-fir	---	---						
		Sugar pine	---	---						
287:										
Ponto	15A	White fir	87	81-90	Slight	Slight	Severe	Slight	Slight	S
		Ponderosa pine	137	130-140						
		Incense-cedar	---	---						
		Douglas-fir	---	---						
		Sugar pine	---	---						
Neer	13F	White fir	78	70-86	Slight	Slight	Severe	Slight	Slight	S
		Ponderosa pine	105	100-109						
		Sugar pine	---	---						
		Douglas-fir	---	---						
		Incense-cedar	---	---						
		California black oak	---	---						

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordi-nation symbol	Commonly grown trees	Potential productivity: Site index	Potential productivity: Site range	Equip-ment limita-tion	Seedling mortality	Plant competi-tion	Hazard of soil damage from--: Fire	Hazard of soil damage from--: Compac-tion
288:									
Ponto	15A	White fir	87	81-90	Slight	Slight	Severe	Slight	Slight
		Ponderosa pine	137	130-140					
		Douglas-fir	---	---					
		Sugar pine	---	---					
		Incense-cedar	---	---					
Wyntoon	9A	Jeffrey pine and ponderosa pine	113	102-125	Slight	Slight	Severe	Slight	Moderate
		White fir	75	58-90					
		Douglas-fir	143	132-153					
		Incense-cedar	---	---					
		California black oak	---	---					
289:									
Quaking	6S	Jeffrey pine and ponderosa pine	89	81-97	Slight	Moderate	Moderate	Moderate	Moderate
		Incense-cedar	---	---					
Kephart	6F	Jeffrey pine and ponderosa pine	91	75-106	Slight	Slight	Severe	Moderate	Moderate
		White fir	---	---					
		Incense-cedar	---	---					
		Sugar pine	---	---					
291 Revit	14A	White fir	84	71-89	Slight	Slight	Severe	Slight	Slight
		Incense-cedar	---	---					
		Knobcone pine	---	---					
		Ponderosa pine	---	---					
297 Rivalier	5F	Ponderosa pine	80	65-95	Slight	Slight	Moderate	Moderate	Moderate
		White fir	54	47-59					
		Incense-cedar	---	---					
		California black oak	---	---					
		Sugar pine	---	---					
298 Rivalier	5R	Ponderosa pine	80	65-95	Moderate	Slight	Moderate	Moderate	Moderate
		White fir	54	47-59					
		Sugar pine	---	---					
		California black oak	---	---					
		Incense-cedar	---	---					

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordi-nation symbol	Commonly grown trees	Potential productivity		Equip-ment limita-tion	Seedling mortality	Plant competi-tion	Hazard of soil damage from--		
			Site index	Site range				Fire	Compac-tion	
299-----------------Rivalier	5R	Ponderosa pine------	80	65-95	Severe--	Slight---	Moderate	Severe--	Moderate	M
		White fir----------	54	47-59						
		Sugar pine---------	---	---						
		California black oak	---	---						
		Incense-cedar-------	---	---						
301: Roundbarn----------	6F	White fir----------	49	40-62	Slight--	Slight---	Moderate	Moderate	Moderate	S
		Jeffrey pine--------	---	---						
		Incense-cedar-------	---	---						
		California black oak	---	---						
		Sugar pine---------	---	---						
Said---------------	5A	Jeffrey pine--------	83	81-84	Slight--	Slight---	Moderate	Slight--	Moderate	S
		White fir----------	53	44-64						
306, 307------------Scarface	7A	Jeffrey pine and ponderosa pine-----	97	85-108	Slight--	Slight---	Severe--	Slight--	Moderate	S
		California black oak	---	---						
		Incense-cedar-------	---	---						
		Sugar pine---------	---	---						
		White fir----------	---	---						
308: Scarface----------	7A	Jeffrey pine and ponderosa pine-----	97	85-108	Slight--	Slight---	Severe--	Slight--	Moderate	S
		Incense-cedar-------	---	---						
		Sugar pine---------	---	---						
		White fir----------	---	---						
Gasper-------------	8F	Jeffrey pine and ponderosa pine-----	108	101-118	Slight--	Slight---	Severe--	Moderate	Moderate	S
		Incense-cedar-------	---	---						
		Sugar pine---------	---	---						
		White fir----------	---	---						
309-----------------Shasta	13S	Ponderosa pine------	141	120-158	Slight--	Slight---	Severe--	Slight--	Moderate	S
		White fir----------	---	---						
		Douglas-fir---------	---	---						
		Sugar pine---------	---	---						
		Incense-cedar-------	---	---						

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Commonly grown trees	Potential productivity: Site index	Potential productivity: Site range	Equipment limitation	Seedling mortality	Plant competition	Hazard of soil damage from--: Fire	Hazard of soil damage from--: Compaction	
310---------------- Shastina	4F	Jeffrey pine--------	77	70-87	Slight--	Slight---	Severe--	Slight--	Moderate	S
		Ponderosa pine------	77	70-87						
		Douglas-fir---------	---	---						
		California black oak	---	---						
		Incense-cedar-------	---	---						
311: Splawn.										
Jellico-----------	3F	Ponderosa pine------	62	52-68	Slight--	Moderate	Moderate	Slight--	Severe--	M
		Western juniper-----	28	27-29						
		Oregon white oak----	---	---						
		Digger pine---------	---	---						
		California black oak	---	---						
312, 313----------- Stacher	9F	White fir----------	61	54-62	Slight--	Slight---	Moderate	Slight--	Slight--	S
		Douglas-fir---------	---	---						
		Sugar pine----------	---	---						
		Ponderosa pine------	---	---						
		California red fir--	---	---						
		Incense-cedar-------	---	---						
314---------------- Stacher	9R	White fir----------	61	54-62	Moderate	Slight---	Moderate	Moderate	Slight--	S
		California red fir--	---	---						
		Sugar pine----------	---	---						
		Ponderosa pine------	---	---						
		Douglas-fir---------	---	---						
		Incense-cedar-------	---	---						
320---------------- Tionesta	6S	Jeffrey pine and ponderosa pine-----	87	78-95	Slight--	Slight---	Severe--	Moderate	Moderate	S
		White fir----------	66	61-73						
		Incense-cedar-------	---	---						
321---------------- Tionesta	6S	Ponderosa pine and Jeffrey pine-------	87	78-95	Slight--	Slight---	Severe--	Moderate	Moderate	S
		White fir----------	66	61-73						
322: Trojan------------	5A	Jeffrey pine--------	82	80-83	Slight--	Slight---	Moderate	Slight--	Severe--	S
		Western juniper-----	---	---						
Erig--------------	4F	Jeffrey pine--------	72	60-82	Slight--	Slight---	Moderate	Slight--	Moderate	S
		White fir----------	---	---						
		Western juniper-----	---	---						
		California black oak	---	---						

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordi- nation symbol	Commonly grown trees	Potential productivity		Equip- ment limita- tion	Seedling mortality	Plant competi- tion	Hazard of soil damage from--		
			Site index	Site range				Fire	Compac- tion	
323 Twinbuttes	7R	Jeffrey pine and ponderosa pine	100	93-107	Moderate	Slight	Severe	Moderate	Moderate	S
		White fir	56	46-63						
		Incense-cedar	---	---						
		Sugar pine	---	---						
324: Twinbuttes	7F	Jeffrey pine and ponderosa pine	100	93-107	Slight	Slight	Severe	Moderate	Moderate	S
		White fir	56	46-63						
		Incense-cedar	---	---						
		Sugar pine	---	---						
Lava flows.										
325, 326 Wengler	8F	White fir	56	52-62	Slight	Slight	Moderate	Moderate	Moderate	S
		Ponderosa pine	99	82-111						
		Sugar pine	---	---						
		Incense-cedar	---	---						
		Douglas-fir	---	---						
327 Wengler	8R	White fir	56	52-62	Moderate	Slight	Moderate	Moderate	Moderate	S
		Ponderosa pine	99	82-111						
		Incense-cedar	---	---						
		Douglas-fir	---	---						
		Sugar pine	---	---						
330 Winnibulli	7W	Ponderosa pine	99	87-109	Moderate	Slight	Severe	Slight	Moderate	M
		California black oak	---	---						
		Oregon white oak	---	---						
331 Winnibulli	7W	Ponderosa pine	99	87-109	Moderate	Slight	Severe	Slight	Moderate	M
		Oregon white oak	---	---						
		California black oak	---	---						
332: Winnibulli	7W	Ponderosa pine	99	87-109	Moderate	Slight	Severe	Slight	Moderate	M
		California black oak	---	---						
		Oregon white oak	---	---						
Burman.										

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Commonly grown trees	Potential productivity		Equipment limitation	Seedling mortality	Plant competition	Hazard of soil damage from--	
			Site index	Site range				Fire	Compaction
333, 334:									
Witcher------------	5C	Jeffrey pine and ponderosa pine-----	79	59-96	Slight--	Slight---	Severe--	Slight--	Moderate
		White fir----------	43	33-58					
		Incense-cedar-------	---	---					
Gosch--------------	6F	Jeffrey pine and ponderosa pine-----	76	63-92	Slight--	Moderate	Moderate	Slight--	Moderate
		White fir----------	50	41-72					
		Incense-cedar-------	---	---					
335----------------- Wyntoon	9A	Jeffrey pine--------	113	102-125	Slight--	Slight---	Severe--	Slight--	Moderate
		Ponderosa pine------	---	---					
		White fir----------	75	58-90					
		Douglas-fir---------	143	132-153					
		Incense-cedar-------	---	---					
		California black oak	---	---					
336----------------- Wyntoon	9A	Jeffrey pine and ponderosa pine-----	113	102-125	Slight--	Slight---	Severe--	Slight--	Moderate
		White fir----------	75	58-90					
		Douglas-fir---------	143	132-153					
		California black oak	---	---					
		Incense-cedar-------	---	---					
337:									
Wyntoon------------	9A	Ponderosa pine------	113	102-125	Slight--	Slight---	Severe--	Slight--	Moderate
		White fir----------	75	58-90					
		Douglas-fir---------	143	132-153					
		Incense-cedar-------	---	---					
		Sugar pine----------	---	---					
		California black oak	---	---					
Depner-------------	10F	White fir----------	66	52-86	Slight--	Slight---	Severe--	Slight--	Slight--
		Douglas-fir---------	116	110-119					
		Incense-cedar-------	---	---					
		Ponderosa pine------	---	---					
		Sugar pine----------	---	---					
		California black oak	---	---					
338:									
Zeugirdor----------	13X	White fir----------	76	61-84	Severe--	Severe---	Moderate	Severe--	Slight--
		Incense-cedar-------	---	---					
		California black oak	---	---					
		Sugar pine----------	---	---					
		Ponderosa pine------	---	---					
		Douglas-fir---------	---	---					

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Commonly grown trees	Potential productivity: Site index	Potential productivity: Site range	Equipment limitation	Seedling mortality	Plant competition	Hazard of soil damage from--: Fire	Hazard of soil damage from--: Compaction	
338:										
Goulder	13F	White fir	76	61-84	Slight	Slight	Severe	Slight	Moderate	S
		Sugar pine	---	---						
		Douglas-fir	---	---						
		Incense-cedar	---	---						
		California red fir	---	---						
		Ponderosa pine	---	---						
		California black oak	---	---						
339:										
Zeugirdor	13R	White fir	76	61-84	Severe	Severe	Moderate	Severe	Slight	M
		Douglas-fir	---	---						
		California black oak	---	---						
		Sugar pine	---	---						
		Ponderosa pine	---	---						
		Incense-cedar	---	---						
Goulder	13R	White fir	76	61-84	Moderate	Slight	Severe	Moderate	Moderate	S
		California black oak	---	---						
		California red fir	---	---						
		Incense-cedar	---	---						
		Sugar pine	---	---						
		Ponderosa pine	---	---						
		Douglas-fir	---	---						

Table 10.--Recreational Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
101: Adinot	Severe: small stones, wetness.	Severe: wetness, small stones.	Severe: slope, small stones, wetness.	Severe: wetness.
102: Adinot	Severe: large stones, wetness.	Severe: wetness, large stones.	Severe: large stones, slope, small stones.	Severe: wetness.
103: Adinot	Severe: slope, large stones, wetness.	Severe: slope, wetness, large stones.	Severe: large stones, slope, small stones.	Severe: wetness.
104: Adinot	Severe: wetness.	Severe: wetness.	Severe: large stones, slope, small stones.	Severe: wetness.
105:				
Adinot	Severe: small stones, wetness.	Severe: wetness, small stones.	Severe: slope, small stones, wetness.	Severe: wetness.
Adinot, eroded	Severe: small stones, wetness, depth to rock.	Severe: wetness, small stones, depth to rock.	Severe: slope, small stones, wetness.	Severe: wetness.
106:				
Badenaugh	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Slight.
Matquaw	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
107:				
Bieber	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight.
Esperanza	Moderate: dusty.	Moderate: dusty.	Moderate: small stones, dusty.	Moderate: dusty.
108:				
Bieber	Severe: cemented pan.	Severe: cemented pan.	Severe: small stones, cemented pan.	Slight.
Modoc	Slight	Slight	Moderate: slope, small stones, cemented pan.	Slight.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
109:				
Blankout	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Medici	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
110:				
Boardburn	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Hambone	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
111 Bollibokka	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: dusty.
112, 113 Bollibokka	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
114 Britton	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
115 Britton	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
116 Britton	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
117:				
Bundora	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Goulder	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
118:				
Bundora	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Goulder	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
119:				
Bundora	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Goulder	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
120------------------- Bunselmeier	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.
121:				
Burman---------------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Lasvar---------------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
122:				
Burney---------------	Moderate: small stones, dusty.	Moderate: small stones, dusty.	Severe: small stones.	Moderate: dusty.
Arkright-------------	Moderate: small stones, dusty.	Moderate: small stones, dusty.	Severe: small stones.	Moderate: dusty.
123:				
Canyoncreek----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Hermit---------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
124:				
Canyoncreek----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Hermit---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
125------------------- Carberry	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
126------------------- Carberry	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
127------------------- Carberry	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
128:				
Carberry-------------	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
Ponto----------------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
129:				
Carberry-------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
Ponto----------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
130:				
Carberry	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
Lava flows	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
131 Chalkford	Severe: flooding.	Moderate: dusty.	Moderate: flooding, dusty.	Moderate: dusty.
132:				
Chatterdown	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Nikal	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
133:				
Chirpchatter	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Hunsinger	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
134 Coneward	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.
135 Coneward	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: too sandy, slope.
136 Coneward	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
137:				
Coneward	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.
Lava flows	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
138 Cupvar	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.
139 Danhunt	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
140, 141 Danhunt	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
142 Daphnedale	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.
143 Datom	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight.
144 Dekkas	Slight	Slight	Moderate: slope, small stones.	Slight.
145 Depner	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
146 Depner	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
147 Deven	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, slope.	Moderate: large stones.
148 Deven	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope.	Moderate: large stones, slope.
149 Deven	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope.	Severe: slope.
150:				
Dosa	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Burman	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
151 Dotta	Severe: flooding.	Moderate: dusty.	Moderate: small stones, flooding, dusty.	Moderate: dusty.
152 Dotta	Slight	Slight	Moderate: slope, small stones.	Slight.
153 Dotta	Slight	Slight	Severe: slope.	Slight.
154 Dotta	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
155 Dotta	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
156:				
Dotta	Slight	Slight	Moderate: slope, small stones.	Slight.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
156:				
Esperanza	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.
157:				
Dotta	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Ricketts	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Moderate: large stones, slope, dusty.
158:				
Dotta	Moderate: slope, small stones, dusty.	Moderate: slope, small stones, dusty.	Severe: slope, small stones.	Moderate: dusty.
Searvar	Moderate: slope, small stones, dusty.	Moderate: slope, small stones, dusty.	Severe: slope, small stones.	Moderate: dusty.
159:				
Dudgen	Severe: ponding, cemented pan.	Severe: ponding, cemented pan.	Severe: ponding, cemented pan.	Severe: ponding.
Graven	Moderate: dusty.	Moderate: dusty.	Moderate: slope, cemented pan, dusty.	Moderate: dusty.
160:				
Dudgen	Severe: flooding, ponding, cemented pan.	Severe: ponding, cemented pan.	Severe: ponding, cemented pan.	Severe: ponding.
Graven	Severe: flooding.	Moderate: wetness, dusty.	Moderate: slope, wetness, flooding.	Moderate: dusty.
161 Esperanza	Slight	Slight	Moderate: slope, small stones.	Slight.
162 Esperanza	Moderate: dusty.	Moderate: dusty.	Moderate: small stones, dusty.	Moderate: dusty.
163 Esro	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
164:				
Etsel	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones.
Neuns	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
165:				
Fiddler	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.	Severe: large stones.
Deven	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope.	Moderate: large stones, slope.
166:				
Fiddler	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.	Severe: large stones, slope.
Deven	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope.	Severe: slope.
167:				
Fiddler	Severe: large stones.	Severe: large stones.	Severe: large stones, slope.	Severe: large stones.
Whitinger	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.
168:				
Fiddler	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.	Severe: large stones.
Whitinger	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
169:				
Gardens	Severe: flooding, ponding, cemented pan.	Severe: ponding, cemented pan.	Severe: ponding, cemented pan.	Severe: ponding.
Jacksback	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
170:				
Gasper	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
170:				
Scarface	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
171:				
Gasper	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Scarface	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
172:				
Gasper	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Scarface	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
173:				
Gasper	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Scarface	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
174:				
Gasper	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Scarface	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
175 Gooval	Severe: wetness.	Severe: wetness.	Severe: large stones, small stones.	Severe: wetness.
176 Gosch	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: slope.
177:				
Gosch	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Witcher	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
178 Goulder	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
179 Goulder	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
180 Goulder	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
181:				
Gullied land	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Mounthat	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.
182:				
Hambone	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
Boardburn	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
183:				
Hambone	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Boardburn	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
184, 185 Henhill	Severe: flooding.	Moderate: wetness, dusty.	Moderate: wetness, flooding, dusty.	Moderate: wetness, dusty.
186:				
Hermit	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Canyoncreek	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
187:				
Hunsinger	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
Chirpchatter	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
188:				
Hunsinger	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
Chirpchatter	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
189:				
Hunsinger	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
189:				
Chirpchatter	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
190 Jacksback	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
191 Jadpor	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight.
192 Jadpor	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.
193:				
Jahjo	Severe: large stones, depth to rock.	Severe: large stones, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: large stones.
Lava flows	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
Loveness	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
194:				
Jellico	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope, small stones.	Moderate: large stones, dusty.
Lava flows	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
195:				
Jellico	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: large stones, slope, dusty.
Splawn	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Moderate: large stones, slope, dusty.
196:				
Jellico	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.
Splawn	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Severe: slope.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
197------------------- Jellycamp	Severe: small stones, depth to rock, cemented pan.	Severe: small stones, depth to rock, cemented pan.	Severe: small stones, depth to rock.	Severe: small stones.
198:				
Jellycamp-----------	Severe: large stones, depth to rock, cemented pan.	Severe: large stones, depth to rock, cemented pan.	Severe: large stones, small stones.	Moderate: large stones, dusty.
Karcal---------------	Moderate: large stones, small stones.	Moderate: large stones, too clayey.	Severe: large stones, small stones.	Moderate: large stones, too clayey.
Longcreek-----------	Severe: large stones, depth to rock.	Severe: large stones, depth to rock.	Severe: large stones, slope, small stones.	Moderate: large stones, dusty.
199:				
Jellycamp-----------	Severe: large stones, depth to rock, cemented pan.	Severe: large stones, depth to rock, cemented pan.	Severe: large stones, small stones.	Moderate: large stones, dusty.
Karcal---------------	Moderate: large stones, small stones.	Moderate: large stones, too clayey.	Severe: large stones, small stones.	Moderate: large stones, too clayey.
Longcreek-----------	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, slope, small stones.	Moderate: dusty.
200:				
Jellycamp-----------	Severe: large stones, depth to rock, cemented pan.	Severe: large stones, depth to rock, cemented pan.	Severe: large stones, slope, small stones.	Moderate: large stones, dusty.
Lassen---------------	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope.	Moderate: large stones.
Longcreek-----------	Severe: large stones, depth to rock.	Severe: large stones, depth to rock.	Severe: large stones, slope, small stones.	Moderate: large stones, dusty.
201:				
Jellycamp-----------	Severe: large stones, depth to rock, cemented pan.	Severe: large stones, depth to rock, cemented pan.	Severe: large stones, small stones.	Moderate: large stones, dusty.
Ollierivas-----------	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, depth to rock.	Severe: erodes easily.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
202:				
Jellycamp	Severe: large stones, depth to rock, cemented pan.	Severe: large stones, depth to rock, cemented pan.	Severe: large stones, slope, small stones.	Moderate: large stones, dusty.
Splawn	Severe: large stones, small stones.	Severe: large stones, small stones.	Severe: large stones, slope, small stones.	Moderate: large stones, dusty.
Ollierivas	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, depth to rock.	Severe: erodes easily.
203:				
Jellycamp	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Severe: erodes easily.
Splawn	Severe: large stones, small stones.	Severe: large stones, small stones.	Severe: large stones, slope, small stones.	Moderate: large stones, dusty.
Ricketts	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Moderate: large stones, slope, dusty.
204, 205, 206:				
Jellycamp	Severe: large stones, depth to rock, cemented pan.	Severe: large stones, depth to rock, cemented pan.	Severe: large stones, small stones.	Moderate: large stones, dusty.
Vansickle	Severe: large stones, depth to rock, cemented pan.	Severe: large stones, depth to rock, cemented pan.	Severe: large stones, small stones.	Severe: large stones.
207:				
Jimmerson loam	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.
Jimmerson stony sandy loam	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
208:				
Jimmerson loam	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
Jimmerson stony sandy loam	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
209:				
Jimmerson stony loam-	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Jimmerson loam-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
210:				
Karcal---------------	Moderate: large stones, small stones.	Moderate: large stones, too clayey.	Severe: large stones, small stones.	Moderate: large stones, too clayey.
Cuppy----------------	Moderate: slope, large stones, too clayey.	Moderate: slope, large stones, too clayey.	Severe: large stones, slope.	Moderate: large stones, too clayey.
211------------------ Keddie	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
212------------------ Keddie	Severe: flooding.	Moderate: wetness.	Moderate: small stones, wetness.	Moderate: wetness.
213------------------ Keddie	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: wetness, flooding, percs slowly.	Moderate: wetness.
214:				
Kephart--------------	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.
Quaking--------------	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.
215------------------ Kettlebelly	Moderate: slope, small stones, dusty.	Moderate: slope, small stones, dusty.	Severe: slope, small stones.	Moderate: dusty.
216:				
Kettlebelly----------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, dusty.
Neuns----------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
217:				
Kettlebelly----------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Neuns----------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
218:				
Kettlebelly----------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, dusty.
Neuns----------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
219:				
Kettlebelly----------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Neuns----------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
220------------------- Kilarc	Moderate: slope, small stones, dusty.	Moderate: slope, small stones, dusty.	Severe: slope, small stones.	Severe: erodes easily.
221------------------- Kilarc	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: erodes easily.
222------------------- Kilarc	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope, erodes easily.
223:				
Kindig---------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
Neuns----------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
224:				
Kindig---------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Neuns----------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
225:				
Lassen---------------	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope.	Moderate: large stones.
Cuppy----------------	Moderate: slope, large stones, too clayey.	Moderate: slope, large stones, too clayey.	Severe: large stones, slope.	Moderate: large stones, too clayey.
226------------------- Lasvar	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
227:				
Lasvar	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Pitvar	Severe: ponding, too clayey.	Severe: ponding, too clayey.	Severe: too clayey, ponding.	Severe: ponding, too clayey.
228 Lava flows	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
229:				
Lava flows	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
Gassaway	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, slope, small stones.	Moderate: large stones, dusty.
230:				
Lava flows	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
Neer	Severe: large stones.	Severe: large stones.	Severe: large stones, slope, small stones.	Moderate: large stones, dusty.
231 Longbell	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
232:				
Longbell	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
Lava flows	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
233:				
Longbilly	Severe: flooding, excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Moderate: dusty.
Modoc	Slight	Slight	Moderate: small stones.	Slight.
234:				
Longbilly	Severe: flooding, excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Moderate: dusty.
Pit	Severe: flooding.	Moderate: too clayey.	Moderate: too clayey, flooding.	Moderate: too clayey.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
235:				
Longcreek	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.
Vansickle	Severe: large stones, depth to rock, cemented pan.	Severe: large stones, depth to rock, cemented pan.	Severe: large stones, slope, small stones.	Severe: large stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
236:				
Lonkey	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.
Datom	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight.
237:				
Lonkey	Moderate: slope, large stones, small stones.	Moderate: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Moderate: large stones.
Malinda	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: small stones.
238:				
Lonkey	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.
Malinda	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: small stones.
239:				
Lonkey	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
Malinda	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: small stones.
240:				
Loveness	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Fleener	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
241:				
Loveness	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Fleener	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
242 Lunsford	Severe: flooding, wetness.	Moderate: wetness, dusty.	Severe: wetness.	Moderate: wetness, dusty.
243 Malinda	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: small stones.
244 Malinda	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: small stones.
245 Malinda	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones.
246 Malinda	Severe: slope, large stones, depth to rock.	Severe: slope, large stones, depth to rock.	Severe: large stones, slope, small stones.	Severe: large stones, slope.
247 Matquaw	Severe: flooding.	Moderate: flooding, wetness, small stones.	Severe: small stones, flooding.	Moderate: flooding.
248 Matquaw	Severe: flooding, small stones.	Severe: small stones.	Severe: small stones, flooding.	Severe: small stones.
249:				
Medici	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Blankout	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
250 Medlake	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
251 Medlake	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
252 Modoc	Moderate: dusty.	Moderate: dusty.	Moderate: small stones.	Moderate: dusty.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
253: Modoc	Slight	Slight	Moderate: slope, small stones, cemented pan.	Slight.
254:				
Mounthat	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
255: Murken	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: large stones, slope, dusty.
256: Nanny	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight.
257: Neer	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
258:				
Neer	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Ponto	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
259:				
Neer	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
Ponto	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
260:				
Neer	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Ponto	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
261, 262:				
Neuns	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Kettlebelly	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
263:				
Neuns	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Kindig	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
264:				
Nikal	Slight	Slight	Moderate: slope, small stones, depth to rock.	Slight.
Chatterdown	Slight	Slight	Moderate: slope, small stones.	Slight.
Lava flows	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight.
265 Nosoni	Severe: flooding, wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.
266:				
Obie	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
Mounthat	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Moderate: large stones.
267:				
Obie	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
Mounthat	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: large stones, slope.
268:				
Obie	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Mounthat	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.
269 Odas	Severe: flooding.	Moderate: wetness.	Moderate: small stones, wetness.	Moderate: wetness.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
270:				
Oxendine	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Severe: large stones, depth to rock, cemented pan.	Moderate: large stones.
Lonkey	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Severe: erodes easily.
271:				
Oxendine	Severe: small stones, cemented pan.	Severe: small stones, cemented pan.	Severe: small stones, cemented pan.	Severe: small stones.
Sweagert	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, cemented pan.	Moderate: dusty.
272:				
Oxendine	Severe: small stones, cemented pan.	Severe: small stones, cemented pan.	Severe: small stones, cemented pan.	Severe: small stones.
Sweagert	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight.
273:				
Oxendine	Severe: large stones, small stones, cemented pan.	Severe: large stones, small stones, cemented pan.	Severe: large stones, small stones.	Moderate: large stones.
Sweagert	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight.
274, 275 Pastolla	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.
276 Pastolla	Severe: flooding, wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.
277 Patburn	Severe: flooding.	Moderate: wetness, dusty.	Moderate: small stones, wetness, flooding.	Moderate: dusty.
278 Patburn	Severe: flooding.	Moderate: wetness.	Moderate: small stones, wetness, flooding.	Slight.
279 Pit	Severe: flooding.	Moderate: flooding, too clayey.	Severe: flooding.	Moderate: too clayey, flooding.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
280: Pit	Severe: flooding.	Moderate: flooding, wetness, too clayey.	Severe: flooding.	Moderate: too clayey, flooding.
281:				
Pits.				
Dumps.				
282: Pittville	Slight	Slight	Moderate: slope, small stones.	Slight.
283: Pittville	Slight	Slight	Severe: slope.	Slight.
284: Pittville	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
285: Pittville	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
286: Ponto	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
287:				
Ponto	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Neer	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
288:				
Ponto	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Wyntoon	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
289:				
Quaking	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.
Kephart	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.
290: Ravendale	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
291: Revit	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
292:				
Ricketts	Severe: large stones.	Severe: large stones.	Severe: large stones, slope, small stones.	Moderate: large stones, dusty.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
292:				
Orhood	Severe: large stones, depth to rock.	Severe: large stones, depth to rock.	Severe: large stones, slope, small stones.	Moderate: large stones.
293:				
Ricketts	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Moderate: large stones, slope, dusty.
Orhood	Severe: slope, large stones, depth to rock.	Severe: slope, large stones, depth to rock.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.
294:				
Ricketts	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Severe: slope.
Orhood	Severe: slope, large stones, depth to rock.	Severe: slope, large stones, depth to rock.	Severe: large stones, slope, small stones.	Severe: slope.
295:				
Ricketts	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Sweagert	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
296:				
Ricketts	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Searvar	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, dusty.
297 Rivalier	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.
298, 299 Rivalier	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
300 Riverwash	Severe: flooding, small stones, wetness.	Severe: wetness, too sandy, small stones.	Severe: small stones, too sandy, wetness.	Severe: wetness, too sandy, small stones.
301:				
Roundbarn	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
301:				
Said	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, dusty.
302:				
Rubble land	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones.
Argixerolls	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
303:				
Rubble land	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
304:				
Rubble land	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones.
Typic Vitrixerands	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
305:				
Rubble land	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones.
Xerorthents	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
306 Scarface	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
307 Scarface	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
308:				
Scarface	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Gasper	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
309------------------- Shasta	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, small stones, too sandy.	Moderate: too sandy.
310------------------- Shastina	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.
311:				
Splawn---------------	Severe: large stones, small stones.	Severe: large stones, small stones.	Severe: large stones, slope, small stones.	Moderate: large stones, dusty.
Jellico--------------	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope, small stones.	Moderate: large stones, dusty.
312------------------- Stacher	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
313------------------- Stacher	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
314------------------- Stacher	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
315------------------- Stoner	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
316:				
Stukel gravelly sandy loam----------------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: slope.
Stukel very cobbly sandy loam----------	Severe: slope, large stones, depth to rock.	Severe: slope, large stones, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: large stones.
317------------------- Swanberger	Severe: ponding, too clayey.	Severe: ponding, too clayey.	Severe: too clayey, ponding.	Severe: ponding, too clayey.
318------------------- Swanberger	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
319------------------- Sweagert	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, cemented pan.	Moderate: dusty.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
320------------------- Tionesta	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.
321------------------- Tionesta	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.
322:				
Trojan---------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
Erig-----------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, dusty.
323------------------- Twinbuttes	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
324:				
Twinbuttes-----------	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.
Lava flows-----------	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
325------------------- Wengler	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.
326------------------- Wengler	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.
327------------------- Wengler	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
328, 329:				
Whipp----------------	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.
Cupvar---------------	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.
330------------------- Winnibulli	Severe: flooding.	Moderate: wetness, dusty.	Moderate: wetness, flooding.	Moderate: wetness, dusty.
331------------------- Winnibulli	Severe: flooding.	Moderate: wetness, dusty.	Moderate: slope, wetness, flooding.	Moderate: dusty.

Table 10.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
332:				
Winnibulli	Severe: flooding.	Moderate: wetness, dusty.	Moderate: slope, wetness, flooding.	Moderate: wetness, dusty.
Burman	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
333:				
Witcher	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Gosch	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
334:				
Witcher	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Gosch	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
335 Wyntoon	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
336 Wyntoon	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
337:				
Wyntoon	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Depner	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
338:				
Zeugirdor	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, small stones.
Goulder	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
339:				
Zeugirdor	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope, small stones.
Goulder	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.

Table 11.--Building Site Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
101 Adinot	Severe: depth to rock, wetness.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: wetness, slope, depth to rock.	Severe: depth to rock, wetness.	Severe: small stones, wetness.
102 Adinot	Severe: depth to rock, wetness.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: wetness, slope, depth to rock.	Severe: depth to rock, wetness.	Severe: large stones, wetness.
103 Adinot	Severe: depth to rock, wetness, slope.	Severe: wetness, slope, depth to rock.	Severe: wetness, depth to rock, slope.	Severe: wetness, slope, depth to rock.	Severe: depth to rock, wetness, slope.	Severe: large stones, wetness, slope.
104 Adinot	Severe: depth to rock, wetness.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: wetness, slope, depth to rock.	Severe: depth to rock, wetness.	Severe: wetness.
105:						
Adinot	Severe: depth to rock, wetness.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: wetness, slope, depth to rock.	Severe: depth to rock, wetness.	Severe: small stones, wetness.
Adinot, eroded	Severe: depth to rock, wetness.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: wetness, slope, depth to rock.	Severe: depth to rock, wetness.	Severe: small stones, wetness, depth to rock.
106:						
Badenaugh	Moderate: large stones, slope.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.	Severe: small stones.
Matquaw	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: droughty, slope.
107:						
Bieber	Severe: cemented pan.	Severe: shrink-swell, cemented pan.	Severe: cemented pan, shrink-swell.	Severe: shrink-swell, cemented pan.	Severe: cemented pan, shrink-swell, low strength.	Severe: cemented pan.
Esperanza	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
108:						
Bieber	Severe: cemented pan.	Severe: shrink-swell, cemented pan.	Severe: cemented pan.	Severe: shrink-swell, cemented pan.	Severe: cemented pan, shrink-swell, low strength.	Severe: cemented pan.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
108:						
Modoc	Severe: cemented pan.	Moderate: shrink-swell, cemented pan.	Severe: cemented pan.	Moderate: shrink-swell, cemented pan.	Moderate: cemented pan, shrink-swell.	Moderate: cemented pan.
109:						
Blankout	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
Medici	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
110:						
Boardburn	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, slope, frost action.	Moderate: slope.
Hambone	Moderate: large stones, slope.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.	Moderate: small stones, large stones, slope.
111 Bollibokka	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
112, 113 Bollibokka	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
114 Britton	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength, frost action.	Severe: depth to rock.
115, 116 Britton	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope, depth to rock.
117:						
Bundora	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.	Moderate: slope.
Goulder	Moderate: large stones, slope.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.	Moderate: small stones, large stones, slope.
118, 119:						
Bundora	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
Goulder	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
120 Bunselmeier	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
121:						
Burman	Severe: cemented pan, wetness.	Severe: wetness, shrink-swell.	Severe: wetness, cemented pan, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.
Lasvar	Severe: cemented pan, cutbanks cave, ponding.	Severe: ponding, shrink-swell.	Severe: ponding, cemented pan, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding, too clayey.
122:						
Burney	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Moderate: slope, large stones.	Moderate: low strength, large stones.	Moderate: small stones.
Arkright	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Moderate: low strength, frost action.	Moderate: small stones, depth to rock.
123, 124:						
Canyoncreek	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Hermit	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
125 Carberry	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, slope.
126, 127 Carberry	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
128:						
Carberry	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, slope.
Ponto	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
129:						
Carberry	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ponto	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
130:						
Carberry	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lava flows	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
131 Chalkford	Moderate: too clayey, wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
132:						
Chatterdown	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.	Moderate: slope.
Nikal	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: frost action.	Moderate: small stones, slope, depth to rock.
133:						
Chirpchatter	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Moderate: shrink-swell, slope, frost action.	Moderate: slope.
Hunsinger	Moderate: large stones, slope.	Moderate: shrink-swell, slope, large stones.	Moderate: slope, shrink-swell, large stones.	Severe: slope.	Moderate: shrink-swell, slope, frost action.	Moderate: small stones, large stones, slope.
134 Coneward	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
135, 136 Coneward	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
137:						
Coneward	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
Lava flows	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
138 Cupvar	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding.	Severe: ponding, flooding, too clayey.
139, 140, 141 Danhunt	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
142 Daphnedale	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: large stones, slope, depth to rock.
143 Datom	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: low strength, frost action.	Severe: depth to rock.
144 Dekkas	Severe: cutbanks cave.	Slight	Slight	Slight	Severe: frost action.	Slight.
145, 146 Depner	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
147: Deven	Severe: depth to rock.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, shrink-swell, low strength.	Severe: large stones, depth to rock.
148, 149: Deven	Severe: depth to rock, slope.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, shrink-swell, low strength.	Severe: large stones, slope.
150:						
Dosa	Severe: cutbanks cave, wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.
Burman	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding.
151: Dotta	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
152: Dotta	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, frost action.	Slight.
153: Dotta	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, frost action.	Slight.
154: Dotta	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, slope, frost action.	Moderate: slope.
155: Dotta	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
156:						
Dotta	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, frost action.	Slight.
Esperanza	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
157:						
Dotta	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ricketts	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
158:						
Dotta------------	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, slope, frost action.	Moderate: small stones, droughty, slope.
Searvar----------	Moderate: depth to rock, large stones, slope.	Moderate: slope, large stones.	Moderate: depth to rock, slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.	Moderate: small stones, droughty, slope.
159:						
Dudgen-----------	Severe: cemented pan, cutbanks cave, ponding.	Severe: ponding.	Severe: ponding, cemented pan.	Severe: ponding.	Severe: ponding.	Severe: ponding, cemented pan.
Graven-----------	Severe: cutbanks cave.	Severe: shrink-swell.	Moderate: wetness, cemented pan.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Moderate: cemented pan.
160:						
Dudgen-----------	Severe: cemented pan, cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding, cemented pan.	Severe: flooding, ponding.	Severe: ponding, flooding.	Severe: ponding, cemented pan.
Graven-----------	Severe: cemented pan, cutbanks cave, wetness.	Severe: flooding, shrink-swell.	Severe: flooding, wetness, cemented pan.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Moderate: flooding, cemented pan.
161, 162---------- Esperanza	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
163--------------- Esro	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
164:						
Etsel------------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: small stones, droughty, slope.
Neuns------------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
165, 166:						
Fiddler----------	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones.	Severe: low strength, slope, large stones.	Severe: large stones, slope.
Deven------------	Severe: depth to rock, slope.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, shrink-swell, low strength.	Severe: large stones, slope.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
167:						
Fiddler----------	Severe: depth to rock, large stones.	Severe: large stones.	Severe: depth to rock, large stones.	Severe: slope, large stones.	Severe: low strength, large stones.	Severe: large stones.
Whitinger--------	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Moderate: droughty, depth to rock.
168:						
Fiddler----------	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones.	Severe: low strength, slope, large stones.	Severe: large stones, slope.
Whitinger--------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Moderate: droughty, depth to rock.
169:						
Gardens----------	Severe: cemented pan, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding, cemented pan.	Severe: flooding, ponding.	Severe: ponding, flooding, frost action.	Severe: ponding, cemented pan.
Jacksback--------	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, frost action.	Severe: wetness.
170, 171:						
Gasper-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Scarface---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
172:						
Gasper-----------	Moderate: large stones, slope.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.	Moderate: large stones, slope.
Scarface---------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
173, 174:						
Gasper-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Scarface---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
175--------------- Gooval	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, wetness.	Severe: wetness.
176--------------- Gosch	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
177:						
Gosch	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Witcher	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
178 Goulder	Moderate: large stones, slope.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.	Moderate: small stones, large stones, slope.
179, 180 Goulder	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
181:						
Gullied land	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: droughty, slope, depth to rock.
Mounthat	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
182, 183:						
Hambone	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Boardburn	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
184, 185 Henhill	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, flooding, frost action.	Moderate: wetness, flooding.
186:						
Hermit	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Canyoncreek	Moderate: large stones, slope.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.	Moderate: slope.
187:						
Hunsinger	Moderate: large stones, slope.	Moderate: shrink-swell, slope, large stones.	Moderate: slope, shrink-swell, large stones.	Severe: slope.	Moderate: shrink-swell, slope, frost action.	Moderate: small stones, large stones, slope.
Chirpchatter	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Moderate: shrink-swell, slope, frost action.	Moderate: slope.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
188, 189:						
Hunsinger	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Chirpchatter	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
190 Jacksback	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, frost action.	Severe: wetness.
191 Jadpor	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: droughty.
192 Jadpor	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: small stones, droughty.
193:						
Jahjo	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, frost action.	Severe: large stones, depth to rock.
Lava flows	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Loveness	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
194:						
Jellico	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Moderate: small stones, large stones, slope.
Lava flows	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
195, 196:						
Jellico	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Splawn	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, large stones, slope.
197 Jellycamp	Severe: depth to rock, cemented pan.	Severe: shrink-swell, depth to rock, cemented pan.	Severe: depth to rock, cemented pan, shrink-swell.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, cemented pan, shrink-swell.	Severe: small stones, depth to rock.
198, 199:						
Jellycamp	Severe: depth to rock, cemented pan.	Severe: shrink-swell, depth to rock, cemented pan.	Severe: depth to rock, cemented pan, shrink-swell.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, cemented pan, shrink-swell.	Severe: large stones, depth to rock.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
198, 199:						
Karcal	Severe: depth to rock, cutbanks cave.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: too clayey.
Longcreek	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, low strength.	Severe: depth to rock.
200:						
Jellycamp	Severe: depth to rock, cemented pan.	Severe: shrink-swell, depth to rock, cemented pan.	Severe: depth to rock, cemented pan, shrink-swell.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, cemented pan, shrink-swell.	Severe: large stones, depth to rock.
Lassen	Severe: depth to rock, cutbanks cave.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Severe: too clayey.
Longcreek	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, low strength.	Severe: depth to rock.
201:						
Jellycamp	Severe: depth to rock, cemented pan.	Severe: shrink-swell, depth to rock, cemented pan.	Severe: depth to rock, cemented pan, shrink-swell.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, cemented pan, shrink-swell.	Severe: large stones, depth to rock.
Ollierivas	Severe: depth to rock, cemented pan.	Severe: shrink-swell.	Severe: depth to rock, cemented pan, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Moderate: depth to rock.
202:						
Jellycamp	Severe: depth to rock, cemented pan.	Severe: shrink-swell, depth to rock, cemented pan.	Severe: depth to rock, cemented pan, shrink-swell.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, cemented pan, shrink-swell.	Severe: large stones, depth to rock.
Splawn	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, shrink-swell, slope.	Severe: small stones, large stones.
Ollierivas	Severe: depth to rock, cemented pan.	Severe: shrink-swell.	Severe: depth to rock, cemented pan, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Moderate: depth to rock.
203:						
Jellycamp	Severe: depth to rock, cemented pan.	Severe: shrink-swell, depth to rock, cemented pan.	Severe: depth to rock, cemented pan, shrink-swell.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, cemented pan, shrink-swell.	Severe: depth to rock.
Splawn	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, shrink-swell, slope.	Severe: small stones, large stones.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
203:						
Ricketts	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
204, 205, 206:						
Jellycamp	Severe: depth to rock, cemented pan.	Severe: shrink-swell, depth to rock, cemented pan.	Severe: depth to rock, cemented pan, shrink-swell.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, cemented pan, shrink-swell.	Severe: large stones, depth to rock.
Vansickle	Severe: depth to rock, cemented pan, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, cemented pan, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, low strength, large stones.	Severe: large stones, depth to rock.
207:						
Jimmerson loam	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, slope, frost action.	Moderate: slope.
Jimmerson stony sandy loam	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, slope, frost action.	Moderate: slope.
208:						
Jimmerson loam	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Jimmerson stony sandy loam	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
209:						
Jimmerson stony loam	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Jimmerson loam	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
210:						
Karcal	Severe: depth to rock, cutbanks cave.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: too clayey.
Cuppy	Severe: depth to rock, cutbanks cave.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Severe: large stones, too clayey.
211 Keddie	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding.	Severe: ponding, excess humus.
212 Keddie	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding, frost action.	Moderate: wetness.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
213--------------- Keddie	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, flooding.	Moderate: wetness, flooding.
214:						
Kephart----------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.	Severe: small stones.
Quaking----------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Severe: small stones.
215--------------- Kettlebelly	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, slope.
216, 217:						
Kettlebelly------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Neuns------------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
218, 219:						
Kettlebelly------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Neuns------------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
220--------------- Kilarc	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell.	Moderate: small stones, droughty, slope.
221, 222---------- Kilarc	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: slope.
223, 224:						
Kindig-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Neuns------------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
225:						
Lassen-----------	Severe: depth to rock, cutbanks cave.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Severe: too clayey.
Cuppy------------	Severe: depth to rock, cutbanks cave.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Severe: large stones, too clayey.
226--------------- Lasvar	Severe: cemented pan, cutbanks cave, ponding.	Severe: ponding, shrink-swell.	Severe: ponding, cemented pan, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding, too clayey.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
227:						
Lasvar	Severe: cemented pan, cutbanks cave, ponding.	Severe: ponding, shrink-swell.	Severe: ponding, cemented pan, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding, too clayey.
Pitvar	Severe: cutbanks cave, ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding, too clayey.
228 Lava flows	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
229:						
Lava flows	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Gassaway	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: large stones, depth to rock.
230:						
Lava flows	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Neer	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Severe: large stones.
231 Longbell	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, droughty, slope.
232:						
Longbell	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, droughty, slope.
Lava flows	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
233:						
Longbilly	Moderate: too clayey, wetness, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Severe: excess sodium.
Modoc	Severe: cemented pan.	Moderate: shrink-swell, cemented pan.	Severe: cemented pan.	Moderate: shrink-swell, cemented pan.	Moderate: cemented pan, shrink-swell.	Moderate: cemented pan.
234:						
Longbilly	Moderate: too clayey, wetness, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Severe: excess sodium.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
234:						
Pit	Severe: cutbanks cave.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Severe: too clayey.
235:						
Longcreek	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, low strength, slope.	Severe: depth to rock.
Vansickle	Severe: depth to rock, cemented pan, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, cemented pan, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, low strength, large stones.	Severe: large stones, depth to rock.
Rock outcrop	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: droughty, slope, depth to rock.
236:						
Lonkey	Moderate: depth to rock, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope, depth to rock.
Datom	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: low strength, frost action.	Severe: depth to rock.
237:						
Lonkey	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, shrink-swell, slope.	Severe: large stones.
Malinda	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: small stones, depth to rock.
238:						
Lonkey	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
Malinda	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: small stones, slope, depth to rock.
239:						
Lonkey	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Malinda	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: small stones, slope, depth to rock.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
240:						
Loveness	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Fleener	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: droughty, slope.
241:						
Loveness	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Fleener	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
242 Lunsford	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Moderate: wetness, flooding.
243 Malinda	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: small stones, depth to rock.
244, 245 Malinda	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: small stones, slope, depth to rock.
246 Malinda	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: large stones, slope, depth to rock.
247 Matquaw	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.
248 Matquaw	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: small stones, flooding.
249:						
Medici	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Blankout	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
250 Medlake	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, slope.
251 Medlake	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
252, 253 Modoc	Severe: cemented pan.	Moderate: shrink-swell, cemented pan.	Severe: cemented pan.	Moderate: shrink-swell, cemented pan.	Moderate: cemented pan, shrink-swell.	Moderate: cemented pan.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
254:						
Mounthat	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Rock outcrop	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: droughty, slope, depth to rock.
255 Murken	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
256 Nanny	Slight	Slight	Slight	Moderate: slope.	Slight	Moderate: small stones, droughty.
257 Neer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
258, 259, 260:						
Neer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ponto	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
261:						
Neuns	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Kettlebelly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
262:						
Neuns	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Kettlebelly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
263:						
Neuns	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Kindig	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
264:						
Nikal	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: frost action.	Moderate: depth to rock.
Chatterdown	Slight	Slight	Slight	Moderate: slope.	Severe: frost action.	Slight.
Lava flows	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
265: Nosoni	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.
266:						
Obie	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: small stones, large stones, slope.
Mounthat	Moderate: depth to rock, large stones, slope.	Moderate: slope, large stones.	Moderate: depth to rock, slope, large stones.	Severe: slope.	Moderate: slope, large stones.	Severe: small stones.
267, 268:						
Obie	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Mounthat	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
269: Odas	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: frost action.	Moderate: wetness, droughty.
270:						
Oxendine	Severe: depth to rock, cemented pan.	Moderate: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Moderate: depth to rock, cemented pan.	Moderate: depth to rock, cemented pan, frost action.	Severe: large stones, depth to rock.
Lonkey	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength.	Moderate: depth to rock.
271:						
Oxendine	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: small stones, cemented pan.
Sweagert	Severe: cemented pan.	Moderate: shrink-swell, cemented pan.	Severe: cemented pan.	Moderate: shrink-swell, cemented pan.	Moderate: cemented pan, shrink-swell, low strength.	Moderate: cemented pan.
272:						
Oxendine	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: small stones, cemented pan.
Sweagert	Severe: cemented pan.	Moderate: shrink-swell, cemented pan.	Severe: cemented pan.	Moderate: shrink-swell, cemented pan.	Moderate: cemented pan, shrink-swell, low strength.	Moderate: small stones, cemented pan.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
273:						
Oxendine	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: small stones, large stones, cemented pan.
Sweagert	Severe: cemented pan.	Moderate: shrink-swell, cemented pan.	Severe: cemented pan.	Moderate: shrink-swell, slope, cemented pan.	Moderate: cemented pan, shrink-swell, low strength.	Moderate: small stones, cemented pan.
274, 275 Pastolla	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding, excess humus.
276 Pastolla	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding, frost action.	Moderate: wetness, flooding.
277, 278 Patburn	Severe: wetness.	Severe: flooding, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, flooding.	Moderate: flooding.
279 Pit	Severe: cutbanks cave.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Severe: flooding, too clayey.
280 Pit	Severe: cutbanks cave, wetness.	Severe: flooding, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Severe: flooding, too clayey.
281:						
Pits.						
Dumps.						
282 Pittville	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, frost action.	Slight.
283 Pittville	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, frost action.	Slight.
284 Pittville	Severe: cutbanks cave.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, slope, frost action.	Moderate: slope.
285 Pittville	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
286 Ponto	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
287:						
Ponto	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Neer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
288:						
Ponto	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Wyntoon	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
289:						
Quaking	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Kephart	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: small stones, slope.
290 Ravendale	Severe: cutbanks cave, ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding, too clayey.
291 Revit	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
292:						
Ricketts	Severe: depth to rock, large stones.	Severe: large stones.	Severe: depth to rock, large stones.	Severe: slope, large stones.	Severe: large stones.	Severe: large stones.
Orhood	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: large stones, depth to rock.
293, 294:						
Ricketts	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
Orhood	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: large stones, slope.
295:						
Ricketts	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: droughty, slope, depth to rock.
Sweagert	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
296:						
Ricketts	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: droughty, slope, depth to rock.
Searvar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
297, 298, 299 Rivalier	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
300 Riverwash	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: small stones, wetness, droughty.
301:						
Roundbarn	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Said	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
302:						
Rubble land	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: small stones, large stones, droughty.
Argixerolls	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
Rock outcrop	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: droughty, slope, depth to rock.
303:						
Rubble land	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: small stones, large stones, droughty.
Rock outcrop	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: droughty, slope, depth to rock.
304:						
Rubble land	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: small stones, large stones, droughty.
Typic Vitrixerands	Severe: depth to rock, cutbanks cave, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
305:						
Rubble land	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: small stones, large stones, droughty.
Xerorthents	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
306 Scarface	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
307 Scarface	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
308:						
Scarface	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Gasper	Moderate: large stones, slope.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.	Moderate: large stones, slope.
309 Shasta	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Slight.
310 Shastina	Severe: cutbanks cave.	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Severe: frost action.	Slight.
311:						
Splawn	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, shrink-swell, slope.	Severe: small stones, large stones.
Jellico	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Moderate: small stones, large stones, slope.
312 Stacher	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
313 Stacher	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, slope.
314 Stacher	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
315 Stoner	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, droughty, slope.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
316:						
Stukel gravelly sandy loam------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope, frost action.	Severe: slope, depth to rock.
Stukel very cobbly sandy loam-----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope, depth to rock.
317-------------- Swanberger	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding, too clayey.
318-------------- Swanberger	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
319-------------- Sweagert	Severe: cemented pan.	Moderate: shrink-swell, cemented pan.	Severe: cemented pan.	Moderate: shrink-swell, cemented pan.	Moderate: cemented pan, shrink-swell, low strength.	Moderate: cemented pan.
320-------------- Tionesta	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Severe: small stones.
321-------------- Tionesta	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
322:						
Trojan-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Erig-------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
323-------------- Twinbuttes	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
324:						
Twinbuttes-------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Severe: small stones.
Lava flows-------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
325-------------- Wengler	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Severe: small stones.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
326, 327---------- Wengler	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
328, 329:						
Whipp------------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
Cupvar-----------	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding.	Severe: ponding, flooding, too clayey.
330--------------- Winnibulli	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: wetness, flooding.
331--------------- Winnibulli	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
332:						
Winnibulli-------	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: wetness, flooding.
Burman-----------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding.	Severe: ponding.
333:						
Witcher----------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Gosch------------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, droughty, slope.
334:						
Witcher----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Gosch------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
335--------------- Wyntoon	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
336--------------- Wyntoon	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
337:						
Wyntoon----------	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
337:						
Depner	Moderate: large stones, slope.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.	Moderate: small stones, large stones, slope.
338, 339:						
Zeugirdor	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, large stones, slope.
Goulder	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

Table 12.--Sanitary Facilities

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
101 Adinot	Severe: depth to rock, wetness.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: depth to rock, small stones.
102 Adinot	Severe: depth to rock, wetness.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: depth to rock, wetness.
103 Adinot	Severe: depth to rock, wetness, slope.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness, slope.	Severe: depth to rock, wetness, slope.	Poor: depth to rock, slope, wetness.
104 Adinot	Severe: depth to rock, wetness.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: depth to rock, wetness.
105:					
Adinot	Severe: depth to rock, wetness.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: depth to rock, small stones.
Adinot, eroded	Severe: depth to rock, wetness.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: depth to rock, wetness.
106:					
Badenaugh	Severe: percs slowly.	Severe: slope.	Severe: large stones.	Moderate: slope.	Poor: small stones.
Matquaw	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope.
107:					
Bieber	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan, too clayey.	Severe: cemented pan.	Poor: cemented pan, too clayey, hard to pack.
Esperanza	Severe: percs slowly.	Moderate: seepage, cemented pan.	Severe: too clayey.	Moderate: cemented pan.	Poor: too clayey.
108:					
Bieber	Severe: cemented pan, percs slowly.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Poor: cemented pan, small stones.
Modoc	Severe: cemented pan, percs slowly.	Severe: cemented pan.	Severe: cemented pan.	Slight	Poor: cemented pan.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
109:					
Blankout	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: small stones.
Medici	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: seepage, small stones.
110:					
Boardburn	Severe: percs slowly.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Fair: depth to rock, slope, thin layer.
Hambone	Severe: percs slowly.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Poor: small stones.
111 Bollibokka	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
112, 113 Bollibokka	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
114 Britton	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, hard to pack, small stones.
115, 116 Britton	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, hard to pack, small stones.
117:					
Bundora	Severe: percs slowly, poor filter.	Severe: seepage, slope.	Moderate: slope.	Severe: seepage.	Poor: small stones.
Goulder	Severe: percs slowly.	Severe: seepage, slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Poor: small stones.
118, 119:					
Bundora	Severe: percs slowly, poor filter, slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: small stones, slope.
Goulder	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.
120 Bunselmeier	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, small stones, slope.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
121:					
Burman	Severe: cemented pan, wetness, percs slowly.	Severe: cemented pan, wetness.	Severe: cemented pan, wetness, too clayey.	Severe: cemented pan, wetness.	Poor: cemented pan, too clayey, hard to pack.
Lasvar	Severe: cemented pan, ponding, percs slowly.	Severe: cemented pan, ponding.	Severe: cemented pan, ponding, too clayey.	Severe: cemented pan, ponding.	Poor: cemented pan, too clayey, hard to pack.
122:					
Burney	Severe: percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock, large stones.	Moderate: depth to rock.	Poor: large stones.
Arkright	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, large stones.
123, 124:					
Canyoncreek	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.
Hermit	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, slope.	Severe: seepage, slope.	Poor: small stones, slope.
125 Carberry	Moderate: depth to rock, slope.	Severe: seepage, slope.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: seepage, small stones.
126, 127 Carberry	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: seepage, small stones, slope.
128:					
Carberry	Moderate: depth to rock, slope.	Severe: seepage, slope.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: seepage, small stones.
Ponto	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: small stones, slope.
129:					
Carberry	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: seepage, small stones, slope.
Ponto	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
130:					
Carberry	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: seepage, small stones, slope.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
130:					
Lava flows	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
131 Chalkford	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: thin layer.
132:					
Chatterdown	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: small stones.
Nikal	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
133:					
Chirpchatter	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: small stones.
Hunsinger	Severe: percs slowly.	Severe: seepage, slope.	Severe: depth to rock, large stones.	Moderate: depth to rock, slope.	Poor: small stones.
134 Coneward	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: cemented pan, too sandy, slope.
135, 136 Coneward	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
137:					
Coneward	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: cemented pan, too sandy, slope.
Lava flows	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
138 Cupvar	Severe: flooding, cemented pan, ponding.	Severe: seepage, cemented pan, flooding.	Severe: flooding, seepage, ponding.	Severe: flooding, cemented pan, seepage.	Poor: cemented pan, ponding.
139, 140, 141 Danhunt	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, small stones, slope.
142 Daphnedale	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
143 Datom	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
144 Dekkas	Severe: poor filter.	Severe: seepage.	Moderate: too sandy.	Severe: seepage.	Fair: too sandy, thin layer.
145, 146 Depner	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: large stones, slope.
147 Deven	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
148, 149 Deven	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
150:					
Dosa	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock.	Severe: depth to rock, wetness, too clayey.	Severe: depth to rock, wetness.	Poor: depth to rock, too clayey, hard to pack.
Burman	Severe: flooding, cemented pan, ponding.	Severe: seepage, cemented pan, flooding.	Severe: flooding, seepage, ponding.	Severe: flooding, cemented pan, seepage.	Poor: cemented pan, ponding.
151 Dotta	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Good.
152 Dotta	Severe: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Good.
153 Dotta	Severe: percs slowly.	Severe: seepage, slope.	Severe: seepage.	Slight	Good.
154 Dotta	Severe: percs slowly.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: slope.
155 Dotta	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
156:					
Dotta	Severe: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Good.
Esperanza	Severe: percs slowly.	Moderate: seepage, cemented pan, slope.	Severe: too clayey.	Moderate: cemented pan.	Poor: too clayey.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
157:					
Dotta	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
Ricketts	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: depth to rock, large stones, slope.
158:					
Dotta	Severe: percs slowly.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Poor: small stones.
Searvar	Severe: depth to rock.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, large stones.	Moderate: slope.	Poor: depth to rock, large stones.
159:					
Dudgen	Severe: cemented pan, ponding, poor filter.	Severe: seepage, cemented pan, ponding.	Severe: seepage, ponding.	Severe: cemented pan, seepage, ponding.	Poor: cemented pan, ponding.
Graven	Severe: cemented pan, wetness, percs slowly.	Severe: seepage, cemented pan, wetness.	Severe: seepage, wetness.	Severe: cemented pan, seepage, wetness.	Poor: cemented pan.
160:					
Dudgen	Severe: flooding, cemented pan, ponding.	Severe: seepage, cemented pan, flooding.	Severe: flooding, seepage, ponding.	Severe: flooding, cemented pan, seepage.	Poor: cemented pan, ponding.
Graven	Severe: flooding, cemented pan, wetness.	Severe: seepage, cemented pan, flooding.	Severe: flooding, cemented pan, seepage.	Severe: flooding, cemented pan, seepage.	Poor: cemented pan.
161 Esperanza	Severe: percs slowly.	Moderate: seepage, cemented pan, slope.	Severe: too clayey.	Moderate: cemented pan.	Poor: too clayey.
162 Esperanza	Severe: percs slowly.	Moderate: seepage, cemented pan.	Severe: too clayey.	Moderate: cemented pan.	Poor: too clayey.
163 Esro	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
164:					
Etsel	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
164:					
Neuns	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, seepage, small stones.
165, 166:					
Fiddler	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
Deven	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
167:					
Fiddler	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Whitinger	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
168:					
Fiddler	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
Whitinger	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
169:					
Gardens	Severe: flooding, cemented pan, ponding.	Severe: seepage, cemented pan, flooding.	Severe: flooding, seepage, ponding.	Severe: flooding, cemented pan, seepage.	Poor: cemented pan, ponding.
Jacksback	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
170, 171:					
Gasper	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: large stones, slope.
Scarface	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: slope.
172:					
Gasper	Severe: percs slowly.	Severe: seepage, slope.	Moderate: slope, large stones.	Severe: seepage.	Poor: large stones.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
172:					
Scarface	Severe: percs slowly.	Severe: seepage, slope.	Moderate: slope.	Severe: seepage.	Fair: small stones, slope.
173, 174:					
Gasper	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: large stones, slope.
Scarface	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: slope.
175 Gooval	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness, too clayey.	Severe: depth to rock, wetness.	Poor: depth to rock, too clayey, small stones.
176 Gosch	Severe: percs slowly, slope, large stones.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope.	Poor: large stones, slope.
177:					
Gosch	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: large stones, slope.
Witcher	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
178 Goulder	Severe: percs slowly.	Severe: seepage, slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Poor: small stones.
179, 180 Goulder	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.
181:					
Gullied land	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Rock outcrop	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
Mounthat	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
182, 183:					
Hambone	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.
Boardburn	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
184, 185 Henhill	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
186:					
Hermit	Moderate: depth to rock, percs slowly, slope.	Severe: seepage, slope.	Severe: depth to rock.	Severe: seepage.	Poor: small stones.
Canyoncreek	Moderate: depth to rock, percs slowly, slope.	Severe: seepage, slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Poor: small stones.
187:					
Hunsinger	Severe: percs slowly.	Severe: seepage, slope.	Severe: depth to rock, large stones.	Moderate: depth to rock, slope.	Poor: small stones.
Chirpchatter	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: small stones.
188, 189:					
Hunsinger	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: depth to rock, slope, large stones.	Severe: slope.	Poor: small stones, slope.
Chirpchatter	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
190 Jacksback	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
191, 192 Jadpor	Severe: percs slowly, large stones.	Severe: large stones.	Severe: large stones.	Slight	Poor: large stones.
193:					
Jahjo	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock.	Poor: depth to rock.
Lava flows	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
Loveness	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, large stones, slope.
194:					
Jellico	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
194:					
Lava flows	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
195, 196:					
Jellico	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
Splawn	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
197 Jellycamp	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan, too clayey.	Severe: depth to rock, cemented pan.	Poor: depth to rock, too clayey, hard to pack.
198, 199:					
Jellycamp	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan, too clayey.	Severe: depth to rock, cemented pan.	Poor: depth to rock, too clayey, hard to pack.
Karcal	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Longcreek	Severe: depth to rock.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
200:					
Jellycamp	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan, slope.	Severe: depth to rock, cemented pan, too clayey.	Severe: depth to rock, cemented pan.	Poor: depth to rock, too clayey, hard to pack.
Lassen	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Longcreek	Severe: depth to rock.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
201:					
Jellycamp	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan, too clayey.	Severe: depth to rock, cemented pan.	Poor: depth to rock, too clayey, hard to pack.
Ollierivas	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan, too clayey.	Severe: depth to rock, cemented pan.	Poor: depth to rock, too clayey, hard to pack.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
202:					
Jellycamp----------	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan, slope.	Severe: depth to rock, cemented pan, too clayey.	Severe: depth to rock, cemented pan.	Poor: depth to rock, too clayey, hard to pack.
Splawn-------------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
Ollierivas---------	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan, too clayey.	Severe: depth to rock, cemented pan.	Poor: depth to rock, too clayey, hard to pack.
203:					
Jellycamp----------	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan, too clayey.	Severe: depth to rock, cemented pan.	Poor: depth to rock, too clayey, hard to pack.
Splawn-------------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
Ricketts-----------	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: depth to rock, large stones, slope.
204, 205, 206:					
Jellycamp----------	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan, too clayey.	Severe: depth to rock, cemented pan.	Poor: depth to rock, too clayey, hard to pack.
Vansickle----------	Severe: depth to rock, cemented pan, large stones.	Severe: depth to rock, cemented pan.	Severe: depth to rock, too clayey, large stones.	Severe: depth to rock, cemented pan.	Poor: depth to rock, too clayey, large stones.
207:					
Jimmerson loam-----	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Poor: thin layer.
Jimmerson stony sandy loam--------	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Poor: thin layer.
208:					
Jimmerson loam-----	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, thin layer.
Jimmerson stony sandy loam--------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, thin layer.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
209:					
Jimmerson stony loam	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, thin layer.
Jimmerson loam	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, thin layer.
210:					
Karcal	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Cuppy	Severe: depth to rock, cemented pan, percs slowly.	Severe: depth to rock, cemented pan, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock, cemented pan.	Poor: depth to rock, too clayey, hard to pack.
211 Keddie	Severe: flooding, ponding.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, ponding.	Severe: flooding, ponding.	Poor: ponding.
212 Keddie	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
213 Keddie	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
214:					
Kephart	Severe: percs slowly.	Severe: seepage, slope.	Moderate: slope.	Severe: seepage.	Fair: slope.
Quaking	Severe: percs slowly.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: seepage, small stones.
215 Kettlebelly	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
216, 217:					
Kettlebelly	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Neuns	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, seepage, small stones.
218, 219:					
Kettlebelly	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
218, 219:					
Neuns	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, seepage, small stones.
220 Kilarc	Severe: percs slowly.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Poor: thin layer.
221, 222 Kilarc	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope, thin layer.
223, 224:					
Kindig	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.
Neuns	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, seepage, small stones.
225:					
Lassen	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Cuppy	Severe: depth to rock, cemented pan, percs slowly.	Severe: depth to rock, cemented pan, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock, cemented pan.	Poor: depth to rock, too clayey, hard to pack.
226 Lasvar	Severe: cemented pan, ponding, percs slowly.	Severe: cemented pan, ponding.	Severe: cemented pan, ponding, too clayey.	Severe: cemented pan, ponding.	Poor: cemented pan, too clayey, hard to pack.
227:					
Lasvar	Severe: cemented pan, ponding, percs slowly.	Severe: cemented pan, ponding.	Severe: cemented pan, ponding, too clayey.	Severe: cemented pan, ponding.	Poor: cemented pan, too clayey, hard to pack.
Pitvar	Severe: ponding, percs slowly.	Severe: ponding.	Severe: cemented pan, ponding, too clayey.	Severe: ponding.	Poor: too clayey, ponding.
228 Lava flows	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
229:					
Lava flows	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
Gassaway	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
230:					
Lava flows	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
Neer	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
231 Longbell	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: seepage.
232:					
Longbell	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: seepage.
Lava flows	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
233:					
Longbilly	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack, excess sodium.
Modoc	Severe: cemented pan, percs slowly.	Severe: cemented pan.	Severe: cemented pan.	Slight	Poor: cemented pan.
234:					
Longbilly	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack, excess sodium.
Pit	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack.
235:					
Longcreek	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
Vansickle	Severe: depth to rock, cemented pan, large stones.	Severe: depth to rock, cemented pan, slope.	Severe: depth to rock, too clayey, large stones.	Severe: depth to rock, cemented pan.	Poor: depth to rock, too clayey, large stones.
Rock outcrop	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
236:					
Lonkey	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
236:					
Datom	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
237:					
Lonkey	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
Malinda	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
238, 239:					
Lonkey	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
Malinda	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
240:					
Loveness	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, large stones, slope.
Fleener	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Poor: small stones.
241:					
Loveness	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Fleener	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
242 Lunsford	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
243 Malinda	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
244, 245, 246 Malinda	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
247, 248 Matquaw	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, small stones.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
249:					
Medici	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, small stones, slope.
Blankout	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
250 Medlake	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: small stones, slope.
251 Medlake	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
252, 253 Modoc	Severe: cemented pan, percs slowly.	Severe: cemented pan.	Severe: cemented pan.	Slight	Poor: cemented pan.
254:					
Mounthat	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
Rock outcrop	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
255 Murken	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
256 Nanny	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
257 Neer	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, seepage, small stones.
258, 259, 260:					
Neer	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, seepage, small stones.
Ponto	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
261:					
Neuns	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, seepage, small stones.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
261:					
Kettlebelly	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
262:					
Neuns	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, seepage, small stones.
Kettlebelly	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
263:					
Neuns	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, seepage, small stones.
Kindig	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.
264:					
Nikal	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
Chatterdown	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
Lava flows	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
265 Nosoni	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
266:					
Obie	Moderate: depth to rock, slope.	Severe: seepage, slope.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: small stones.
Mounthat	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
267, 268:					
Obie	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Mounthat	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
269----------------- Odas	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: small stones, wetness.
270:					
Oxendine-----------	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Severe: depth to rock.	Slight-----------	Poor: depth to rock.
Lonkey------------	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
271, 272:					
Oxendine-----------	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Poor: depth to rock.
Sweagert-----------	Severe: cemented pan, percs slowly.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Poor: cemented pan.
273:					
Oxendine-----------	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Poor: depth to rock, small stones.
Sweagert-----------	Severe: cemented pan, percs slowly.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Poor: cemented pan.
274, 275------------ Pastolla	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, seepage, wetness.	Poor: too clayey, hard to pack, wetness.
276----------------- Pastolla	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: too clayey, hard to pack, wetness.
277, 278------------ Patburn	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey.
279----------------- Pit	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack.
280----------------- Pit	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack.
281:					
Pits.					
Dumps.					
282----------------- Pittville	Severe: percs slowly.	Severe: seepage.	Severe: seepage.	Slight-----------	Fair: thin layer.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
283-----------------Pittville	Severe: percs slowly.	Severe: seepage, slope.	Severe: seepage.	Slight-----------	Fair: thin layer.
284-----------------Pittville	Severe: percs slowly.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: slope, thin layer.
285-----------------Pittville	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
286-----------------Ponto	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: small stones, slope.
287:					
Ponto--------------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Neer---------------	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
288:					
Ponto--------------	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: small stones, slope.
Wyntoon------------	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope, thin layer.
289:					
Quaking------------	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, small stones, slope.
Kephart------------	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: slope.
290-----------------Ravendale	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: depth to rock, seepage, ponding.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
291-----------------Revit	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
292:					
Ricketts-----------	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: depth to rock, large stones.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
292:					
Orhood	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: depth to rock, small stones.
293, 294:					
Ricketts	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: depth to rock, large stones, slope.
Orhood	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
295:					
Ricketts	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, seepage, small stones.
Sweagert	Severe: depth to rock, ponding, percs slowly.	Severe: seepage, depth to rock, ponding.	Severe: depth to rock, ponding.	Severe: depth to rock, seepage, ponding.	Poor: depth to rock, ponding.
296:					
Ricketts	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, seepage, small stones.
Searvar	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope.	Poor: depth to rock, large stones, slope.
297, 298, 299 Rivalier	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
300 Riverwash	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: too sandy, small stones, wetness.
301:					
Roundbarn	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: large stones, slope.
Said	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, large stones.	Severe: slope.	Poor: large stones, slope.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
302:					
Rubble land	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, seepage, small stones.
Argixerolls	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, seepage, small stones.
Rock outcrop	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
303:					
Rubble land	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, seepage, small stones.
Rock outcrop	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
304:					
Rubble land	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, seepage, small stones.
Typic Vitrixerands	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, seepage, small stones.
305:					
Rubble land	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, seepage, small stones.
Xerorthents	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
306 Scarface	Severe: percs slowly.	Severe: seepage, slope.	Moderate: slope.	Severe: seepage.	Fair: small stones, slope.
307 Scarface	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: slope.
308:					
Scarface	Severe: percs slowly.	Severe: seepage, slope.	Moderate: slope.	Severe: seepage.	Fair: small stones, slope.
Gasper	Severe: percs slowly.	Severe: seepage, slope.	Moderate: slope, large stones.	Severe: seepage.	Poor: large stones.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
309----------------- Shasta	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
310----------------- Shastina	Severe: poor filter.	Severe: seepage.	Severe: seepage, large stones.	Severe: seepage.	Poor: seepage, large stones.
311:					
Splawn--------------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
Jellico-------------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
312----------------- Stacher	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: seepage, small stones, slope.
313----------------- Stacher	Severe: percs slowly.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope.	Poor: seepage, small stones.
314----------------- Stacher	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: seepage, small stones, slope.
315----------------- Stoner	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: small stones.
316:					
Stukel gravelly sandy loam--------	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
Stukel very cobbly sandy loam--------	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, large stones, slope.
317, 318------------ Swanberger	Severe: ponding, percs slowly.	Severe: ponding.	Severe: cemented pan, ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
319----------------- Sweagert	Severe: cemented pan, percs slowly.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Poor: cemented pan.
320----------------- Tionesta	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: seepage, small stones.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
321----------------- Tionesta	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, small stones, slope.
322:					
Trojan-------------	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.
Erig---------------	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, large stones.	Severe: slope.	Poor: large stones, slope.
323----------------- Twinbuttes	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, small stones, slope.
324:					
Twinbuttes---------	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: seepage, small stones.
Lava flows---------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
325----------------- Wengler	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
326, 327------------ Wengler	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
328, 329:					
Whipp--------------	Severe: cemented pan, wetness.	Severe: seepage, cemented pan, wetness.	Severe: seepage, wetness.	Severe: cemented pan, seepage, wetness.	Poor: cemented pan, wetness.
Cupvar-------------	Severe: flooding, cemented pan, ponding.	Severe: seepage, cemented pan, flooding.	Severe: flooding, seepage, ponding.	Severe: flooding, cemented pan, seepage.	Poor: cemented pan, ponding.
330----------------- Winnibulli	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
331----------------- Winnibulli	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: wetness, thin layer.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
332:					
Winnibulli	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
Burman	Severe: cemented pan, ponding, percs slowly.	Severe: seepage, cemented pan, ponding.	Severe: seepage, ponding.	Severe: cemented pan, seepage, ponding.	Poor: cemented pan, ponding.
333:					
Witcher	Severe: percs slowly.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Fair: depth to rock, slope, thin layer.
Gosch	Severe: percs slowly.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Poor: large stones.
334:					
Witcher	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
Gosch	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: large stones, slope.
335 Wyntoon	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope, thin layer.
336 Wyntoon	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
337:					
Wyntoon	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope, thin layer.
Depner	Moderate: depth to rock, slope, large stones.	Severe: seepage, slope.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: large stones.
338, 339:					
Zeugirdor	Severe: percs slowly, slope.	Severe: seepage, slope, large stones.	Severe: slope, large stones.	Severe: seepage, slope.	Poor: small stones, slope.
Goulder	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.

Table 13.--Construction Materials

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
101, 102, 103, 104: Adinot	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, wetness.
105:				
Adinot	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, wetness.
Adinot, eroded	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, wetness.
106:				
Badenaugh	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Matquaw	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
107:				
Bieber	Poor: cemented pan, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: cemented pan.
Esperanza	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
108:				
Bieber	Poor: cemented pan.	Improbable: excess fines.	Improbable: excess fines.	Poor: cemented pan, small stones, area reclaim.
Modoc	Poor: cemented pan.	Improbable: excess fines.	Improbable: excess fines.	Fair: cemented pan, too clayey, small stones.
109:				
Blankout	Good	Improbable: small stones.	Probable	Poor: small stones, area reclaim.
Medici	Good	Probable	Improbable: thin layer.	Poor: small stones, area reclaim.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
110:				
Boardburn	Fair: depth to rock, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Hambone	Fair: depth to rock, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
111 Bollibokka	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
112, 113 Bollibokka	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
114 Britton	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
115 Britton	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
116 Britton	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
117:				
Bundora	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Goulder	Fair: depth to rock, large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim.
118:				
Bundora	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Goulder	Fair: depth to rock, large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
119:				
Bundora	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Goulder	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
120------------------- Bunselmeier	Fair: thin layer, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, area reclaim, slope.
121:				
Burman---------------	Poor: cemented pan, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Lasvar---------------	Poor: cemented pan, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
122:				
Burney---------------	Fair: depth to rock, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Arkright-------------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
123:				
Canyoncreek----------	Fair: depth to rock, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Hermit---------------	Fair: depth to rock, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
124:				
Canyoncreek----------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Hermit---------------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
125------------------- Carberry	Fair: depth to rock, thin layer.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, area reclaim.
126------------------- Carberry	Fair: depth to rock, thin layer, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, area reclaim, slope.
127------------------- Carberry	Poor: slope.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, area reclaim, slope.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
128:				
Carberry	Fair: depth to rock, thin layer.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, area reclaim.
Ponto	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
129:				
Carberry	Fair: depth to rock, thin layer, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, area reclaim, slope.
Ponto	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
130:				
Carberry	Fair: depth to rock, thin layer, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, area reclaim, slope.
Lava flows	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
131 Chalkford	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
132:				
Chatterdown	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Nikal	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
133:				
Chirpchatter	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Hunsinger	Fair: depth to rock, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
134 Coneward	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, area reclaim, slope.
135 Coneward	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
136 Coneward	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
137:				
Coneward	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, area reclaim, slope.
Lava flows	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
138 Cupvar	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
139 Danhunt	Fair: slope.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, area reclaim, slope.
140, 141 Danhunt	Poor: slope.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, area reclaim, slope.
142 Daphnedale	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
143 Datom	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey.
144 Dekkas	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
145 Depner	Fair: depth to rock, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
146 Depner	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
147, 148, 149 Deven	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, small stones.
150:				
Dosa	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Burman	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
151 Dotta	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
152, 153: Dotta	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
154: Dotta	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
155: Dotta	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
156:				
Dotta	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Esperanza	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
157:				
Dotta	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Ricketts	Poor: depth to rock, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, slope.
158:				
Dotta	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Searvar	Poor: depth to rock.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones.
159:				
Dudgen	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: cemented pan, wetness.
Graven	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
160:				
Dudgen	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: cemented pan, wetness.
Graven	Poor: cemented pan.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
161, 162: Esperanza	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
163: Esro	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, wetness.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
164:				
Etsel	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Neuns	Poor: depth to rock, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, slope.
165, 166:				
Fiddler	Poor: depth to rock, low strength, large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones, slope.
Deven	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, small stones.
167:				
Fiddler	Poor: depth to rock, low strength, large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones.
Whitinger	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
168:				
Fiddler	Poor: depth to rock, low strength, large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones, slope.
Whitinger	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
169:				
Gardens	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: cemented pan, wetness.
Jacksback	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
170:				
Gasper	Fair: large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
Scarface	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
171:				
Gasper	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
171:				
Scarface	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
172:				
Gasper	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim.
Scarface	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
173:				
Gasper	Fair: large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
Scarface	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
174:				
Gasper	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
Scarface	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
175 Gooval	Poor: depth to rock, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, wetness.
176 Gosch	Poor: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
177:				
Gosch	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Witcher	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
178 Goulder	Fair: depth to rock, large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim.
179 Goulder	Fair: depth to rock, large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
180------------------- Goulder	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
181:				
Gullied land---------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Rock outcrop---------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Mounthat-------------	Poor: depth to rock, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
182:				
Hambone--------------	Fair: depth to rock, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Boardburn------------	Fair: depth to rock, shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
183:				
Hambone--------------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Boardburn------------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
184------------------- Henhill	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
185------------------- Henhill	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
186:				
Hermit---------------	Fair: depth to rock, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Canyoncreek----------	Fair: depth to rock, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
187:				
Hunsinger------------	Fair: depth to rock, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Chirpchatter---------	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
188:				
Hunsinger	Fair: depth to rock, shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Chirpchatter	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
189:				
Hunsinger	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Chirpchatter	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
190 Jacksback	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
191, 192 Jadpor	Poor: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim.
193:				
Jahjo	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
Lava flows	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
Loveness	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
194:				
Jellico	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Lava flows	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
195:				
Jellico	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Splawn	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
196:				
Jellico	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
196:				
Splawn	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
197 Jellycamp	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, cemented pan, too clayey.
198, 199:				
Jellycamp	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, cemented pan, too clayey.
Karcal	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones.
Longcreek	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, large stones.
200:				
Jellycamp	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, cemented pan, too clayey.
Lassen	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
Longcreek	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, large stones.
201:				
Jellycamp	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, cemented pan, too clayey.
Ollierivas	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
202:				
Jellycamp	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, cemented pan, too clayey.
Splawn	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
202:				
Ollierivas----------	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
203:				
Jellycamp-----------	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, cemented pan, too clayey.
Splawn--------------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Ricketts------------	Poor: depth to rock, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, slope.
204, 205, 206:				
Jellycamp-----------	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, cemented pan, too clayey.
Vansickle-----------	Poor: depth to rock, low strength, large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, cemented pan, too clayey.
207:				
Jimmerson loam-------	Fair: shrink-swell, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, slope.
Jimmerson stony sandy loam----------------	Fair: shrink-swell, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, slope.
208:				
Jimmerson loam-------	Fair: shrink-swell, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Jimmerson stony sandy loam----------------	Fair: shrink-swell, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
209:				
Jimmerson stony loam-	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Jimmerson loam-------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
210:				
Karcal	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones.
Cuppy	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
211 Keddie	Poor: wetness.	Probable	Probable	Poor: wetness.
212 Keddie	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
213 Keddie	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
214:				
Kephart	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Quaking	Good	Improbable: small stones.	Probable	Poor: small stones, area reclaim.
215 Kettlebelly	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
216:				
Kettlebelly	Fair: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Neuns	Poor: depth to rock.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, slope.
217:				
Kettlebelly	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Neuns	Poor: depth to rock, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, slope.
218:				
Kettlebelly	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
Neuns	Poor: depth to rock.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, slope.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
219:				
Kettlebelly	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
Neuns	Poor: depth to rock, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, slope.
220 Kilarc	Poor: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
221 Kilarc	Poor: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
222 Kilarc	Poor: shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
223:				
Kindig	Fair: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Neuns	Poor: depth to rock.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, slope.
224:				
Kindig	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Neuns	Poor: depth to rock, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, slope.
225:				
Lassen	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
Cuppy	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
226 Lasvar	Poor: cemented pan, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
227:				
Lasvar	Poor: cemented pan, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Pitvar	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
228 Lava flows	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
229:				
Lava flows	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
Gassaway	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
230:				
Lava flows	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
Neer	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
231 Longbell	Good	Probable	Probable	Poor: small stones, area reclaim.
232:				
Longbell	Good	Probable	Probable	Poor: small stones, area reclaim.
Lava flows	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
233:				
Longbilly	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
Modoc	Poor: cemented pan.	Improbable: excess fines.	Improbable: excess fines.	Fair: cemented pan, too clayey, small stones.
234:				
Longbilly	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
Pit	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
235:				
Longcreek	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, large stones.
Vansickle	Poor: depth to rock, low strength, large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, cemented pan, too clayey.
Rock outcrop	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
236:				
Lonkey	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey, small stones.
Datom	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey.
237:				
Lonkey	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Malinda	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
238, 239:				
Lonkey	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Malinda	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
240:				
Loveness	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Fleener	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
241:				
Loveness	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Fleener	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
242: Lunsford	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
243: Malinda	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
244: Malinda	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
245, 246: Malinda	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
247, 248: Matquaw	Fair: wetness.	Probable	Probable	Poor: small stones, area reclaim.
249:				
Medici	Fair: slope.	Probable	Improbable: thin layer.	Poor: small stones, area reclaim, slope.
Blankout	Fair: slope.	Improbable: small stones.	Probable	Poor: small stones, area reclaim, slope.
250: Medlake	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, small stones.
251: Medlake	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, small stones, slope.
252, 253: Modoc	Poor: cemented pan.	Improbable: excess fines.	Improbable: excess fines.	Fair: cemented pan, too clayey, small stones.
254:				
Mounthat	Poor: depth to rock, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
255: Murken	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
256: Nanny	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
257-------------------Neer	Poor: depth to rock, slope.	Improbable: thin layer.	Improbable: thin layer.	Poor: small stones, slope.
258:				
Neer-----------------	Poor: depth to rock, slope.	Improbable: thin layer.	Improbable: thin layer.	Poor: small stones, slope.
Ponto----------------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
259:				
Neer-----------------	Poor: depth to rock.	Improbable: thin layer.	Improbable: thin layer.	Poor: small stones, slope.
Ponto----------------	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
260:				
Neer-----------------	Poor: depth to rock, slope.	Improbable: thin layer.	Improbable: thin layer.	Poor: small stones, slope.
Ponto----------------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
261:				
Neuns----------------	Poor: depth to rock, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, slope.
Kettlebelly----------	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
262:				
Neuns----------------	Poor: depth to rock, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, slope.
Kettlebelly----------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
263:				
Neuns----------------	Poor: depth to rock, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, slope.
Kindig---------------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
264:				
Nikal----------------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
264:				
Chatterdown	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Lava flows	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
265 Nosoni	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
266:				
Obie	Fair: depth to rock, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Mounthat	Poor: depth to rock.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones.
267:				
Obie	Fair: depth to rock, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Mounthat	Poor: depth to rock.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
268:				
Obie	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Mounthat	Poor: depth to rock, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
269 Odas	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
270:				
Oxendine	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, cemented pan, large stones.
Lonkey	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey, small stones.
271:				
Oxendine	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: cemented pan, small stones.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
271:				
Sweagert	Poor: cemented pan.	Improbable: excess fines.	Improbable: excess fines.	Fair: cemented pan, too clayey, small stones.
272, 273:				
Oxendine	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: cemented pan, small stones.
Sweagert	Poor: cemented pan.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
274, 275 Pastolla	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
276 Pastolla	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
277, 278 Patburn	Fair: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
279 Pit	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
280 Pit	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
281:				
Pits.				
Dumps.				
282, 283 Pittville	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
284 Pittville	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
285 Pittville	Fair: shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
286 Ponto	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
287:				
Ponto	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Neer	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
288:				
Ponto	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Wyntoon	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
289:				
Quaking	Fair: slope.	Improbable: small stones.	Probable	Poor: small stones, area reclaim, slope.
Kephart	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
290 Ravendale	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
291 Revit	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
292:				
Ricketts	Poor: depth to rock, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones.
Orhood	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
293:				
Ricketts	Poor: depth to rock, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, slope.
Orhood	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
294:				
Ricketts	Poor: depth to rock, large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, slope.
Orhood	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
295:				
Ricketts	Poor: depth to rock.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
295:				
Sweagert	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, wetness.
296:				
Ricketts	Poor: depth to rock.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones.
Searvar	Poor: depth to rock.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, slope.
297 Rivalier	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
298, 299 Rivalier	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
300 Riverwash	Poor: wetness.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
301:				
Roundbarn	Fair: depth to rock, thin layer, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
Said	Fair: depth to rock, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
302:				
Rubble land	Poor: depth to rock, slope.	Improbable: small stones.	Probable	Poor: depth to rock, small stones, area reclaim.
Argixerolls	Poor: depth to rock, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: depth to rock, small stones, slope.
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
303:				
Rubble land	Poor: depth to rock, slope.	Improbable: small stones.	Probable	Poor: depth to rock, small stones, area reclaim.
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
304:				
Rubble land	Poor: depth to rock, slope.	Improbable: small stones.	Probable	Poor: depth to rock, small stones, area reclaim.
Typic Vitrixerands	Poor: depth to rock, slope.	Improbable: small stones.	Probable	Poor: small stones, area reclaim, slope.
305:				
Rubble land	Poor: depth to rock, slope.	Improbable: small stones.	Probable	Poor: depth to rock, small stones, area reclaim.
Xerorthents	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
306 Scarface	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
307 Scarface	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
308:				
Scarface	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Gasper	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim.
309 Shasta	Good	Probable	Probable	Poor: small stones.
310 Shastina	Fair: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: area reclaim, small stones.
311:				
Splawn	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Jellico	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
312 Stacher	Fair: slope.	Improbable: small stones.	Probable	Poor: small stones, area reclaim, slope.
313 Stacher	Good	Improbable: small stones.	Probable	Poor: small stones, area reclaim.
314 Stacher	Poor: slope.	Improbable: small stones.	Probable	Poor: small stones, area reclaim, slope.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
315: Stoner	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
316:				
Stukel gravelly sandy loam	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Stukel very cobbly sandy loam	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, large stones, slope.
317, 318: Swanberger	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
319: Sweagert	Poor: cemented pan.	Improbable: excess fines.	Improbable: excess fines.	Fair: cemented pan, too clayey, small stones.
320: Tionesta	Good	Probable	Probable	Poor: small stones, area reclaim.
321: Tionesta	Fair: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
322:				
Trojan	Fair: depth to rock, shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Erig	Fair: depth to rock, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
323: Twinbuttes	Poor: slope.	Improbable: small stones.	Probable	Poor: small stones, area reclaim, slope.
324:				
Twinbuttes	Good	Improbable: small stones.	Probable	Poor: small stones, area reclaim.
Lava flows	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
325: Wengler	Good	Improbable: small stones.	Probable	Poor: too sandy, small stones, area reclaim.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
326-------------------- Wengler	Fair: slope.	Improbable: small stones.	Probable-------------	Poor: too sandy, small stones, area reclaim.
327-------------------- Wengler	Poor: slope.	Improbable: small stones.	Probable-------------	Poor: too sandy, small stones, area reclaim.
328, 329:				
Whipp-----------------	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
Cupvar----------------	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
330-------------------- Winnibulli	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
331-------------------- Winnibulli	Fair: wetness.	Improbable: small stones.	Probable-------------	Fair: too clayey, small stones, area reclaim.
332:				
Winnibulli-----------	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Burman----------------	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
333:				
Witcher---------------	Fair: depth to rock, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Gosch-----------------	Fair: depth to rock, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
334:				
Witcher---------------	Fair: depth to rock, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Gosch-----------------	Fair: depth to rock, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
335------------------- Wyntoon	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
336------------------- Wyntoon	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
337:				
Wyntoon--------------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
Depner---------------	Fair: depth to rock, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
338:				
Zeugirdor------------	Fair: large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Goulder--------------	Fair: depth to rock, large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
339:				
Zeugirdor------------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Goulder--------------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.

Table 14.--Water Management

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions
"moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The informa
this table indicates the dominant soil condition but does not eliminate the need for onsite investigat

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting- Drainage	Irrigation	Terraces diversi
101, 102, 103, 104: Adinot	Severe: slope, depth to rock.	Severe: thin layer, wetness.	Severe: no water.	Slope, depth to rock.	Slope, wetness, depth to rock.	Slope, wetness, depth to
105: Adinot	Severe: slope, depth to rock.	Severe: thin layer, wetness.	Severe: no water.	Slope, depth to rock.	Slope, wetness, depth to rock.	Slope, wetness, depth to
Adinot, eroded	Severe: slope, depth to rock.	Severe: thin layer, wetness.	Severe: no water.	Slope, depth to rock.	Slope, wetness, depth to rock.	Slope, wetness, depth to
106: Badenaugh	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large sto slope.
Matquaw	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing, droughty.	Slope, soil blo
107: Bieber	Severe: cemented pan.	Severe: thin layer.	Severe: no water.	Deep to water	Cemented pan, percs slowly, soil blowing.	Cemented percs sl soil blo
Esperanza	Moderate: cemented pan.	Moderate: piping, thin layer.	Severe: no water.	Deep to water	Percs slowly	Favorable
108: Bieber	Severe: cemented pan.	Severe: thin layer.	Severe: no water.	Deep to water	Cemented pan, percs slowly.	Cemented percs sl
Modoc	Moderate: cemented pan.	Severe: thin layer.	Severe: no water.	Deep to water	Cemented pan, soil blowing.	Cemented soil blo
109: Blankout	Severe: seepage, slope.	Moderate: seepage, thin layer.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blo

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting- Drainage	Irrigation	Terraces diversi
109:						
Medici	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blo
110:						
Boardburn	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blo
Hambone	Severe: slope.	Moderate: large stones, thin layer.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large sto slope.
111, 112, 113 Bollibokka	Severe: slope, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to
114, 115, 116 Britton	Severe: slope, depth to rock.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, soil blowing, depth to rock.	Slope, soil blo depth to
117, 118, 119:						
Bundora	Severe: seepage, slope.	Moderate: seepage.	Severe: no water.	Deep to water	Slope	Slope
Goulder	Severe: slope.	Moderate: large stones.	Severe: no water.	Deep to water	Large stones, slope.	Large sto slope.
120 Bunselmeier	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty.	Slope
121:						
Burman	Moderate: cemented pan.	Severe: thin layer, wetness.	Severe: no water.	Cemented pan, percs slowly.	Cemented pan, percs slowly, wetness.	Erodes ea cemented wetness.
Lasvar	Moderate: cemented pan, seepage.	Severe: ponding.	Severe: no water.	Cemented pan, percs slowly, ponding.	Percs slowly, slow intake, ponding.	Erodes ea cemented ponding.
122:						
Arkright	Moderate: slope, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Large sto depth to

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting- Drainage	Irrigation	Terraces diversi
122:						
Burney----------	Moderate: seepage, slope, depth to rock.	Moderate: piping, thin layer.	Severe: no water.	Deep to water	Rooting depth, slope.	Favorable
123, 124:						
Canyoncreek-----	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Large stones, slope, soil blowing.	Large sto slope, soil blo
Hermit----------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blo
125, 126, 127---- Carberry	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Large sto slope, soil blo
128, 129:						
Carberry--------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Large sto slope, soil blo
Ponto-----------	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blo
130:						
Carberry--------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Large sto slope, soil blo
Lava flows------	Severe: slope, depth to rock.	Slight---------	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to
131------------- Chalkford	Slight---------	Moderate: piping, wetness.	Severe: slow refill.	Deep to water	Erodes easily, flooding.	Erodes ea
132:						
Chatterdown-----	Severe: seepage, slope.	Moderate: seepage, piping, thin layer.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blo

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces a[nd] diversion[s]
132:						
Nikal	Severe: seepage, slope.	Moderate: seepage, piping, thin layer.	Severe: no water.	Deep to water	Slope, soil blowing, depth to rock.	Large stone[s], slope, depth to r[ock].
133:						
Chirpchatter	Severe: seepage, slope.	Moderate: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blowi[ng].
Hunsinger	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone[s], slope.
134, 135, 136: Coneward	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Slope, too sandy, soil blowi[ng].
137:						
Coneward	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Slope, too sandy, soil blowi[ng].
Lava flows	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to r[ock].
138: Cupvar	Severe: seepage.	Severe: piping, ponding.	Severe: no water.	Cemented pan, percs slowly, ponding.	Percs slowly, slow intake, ponding.	Cemented pa[n], ponding.
139, 140, 141: Danhunt	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, too sandy, soil blowi[ng].
142: Daphnedale	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Percs slowly, slope, depth to rock.	Percs slowl[y], slope, depth to r[ock].
143: Datom	Severe: depth to rock.	Severe: hard to pack.	Severe: no water.	Deep to water	Percs slowly, slope, soil blowing.	Erodes easi[ly], soil blowi[ng], depth to r[ock].
144: Dekkas	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Soil blowing	Too sandy, soil blowi[ng].

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces a[nd] diversion[s]
145, 146--------- Depner	Severe: seepage, slope.	Moderate: large stones, seepage, thin layer.	Severe: no water.	Deep to water	Large stones, slope, soil blowing.	Large stone[s,] slope, soil blowi[ng.]
147, 148, 149---- Deven	Severe: slope, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Percs slowly, slope, depth to rock.	Percs slowl[y,] slope, depth to r[ock.]
150:						
Dosa------------	Moderate: depth to rock.	Severe: thin layer, wetness.	Severe: no water.	Percs slowly, depth to rock.	Percs slowly, wetness, droughty.	Erodes easi[ly,] wetness, depth to r[ock.]
Burman----------	Severe: seepage.	Severe: thin layer, ponding.	Severe: no water.	Flooding, cemented pan, ponding.	Erodes easily, cemented pan, ponding.	Erodes easi[ly,] cemented p[an,] ponding.
151------------- Dotta	Slight---------	Moderate: wetness.	Severe: slow refill.	Deep to water	Erodes easily, flooding.	Erodes easi[ly]
152, 153--------- Dotta	Severe: seepage.	Moderate: piping, thin layer.	Severe: no water.	Deep to water	Slope, soil blowing.	Soil blowin[g]
154, 155--------- Dotta	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blowi[ng.]
156:						
Dotta-----------	Severe: seepage.	Moderate: piping, thin layer.	Severe: no water.	Deep to water	Soil blowing---	Soil blowin[g]
Esperanza-------	Moderate: cemented pan, seepage.	Moderate: thin layer.	Severe: no water.	Deep to water	Percs slowly---	Percs slowl[y]
157:						
Dotta-----------	Severe: seepage, slope.	Moderate: piping, thin layer.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blowi[ng.]
Ricketts--------	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone[s,] slope, depth to r[ock.]

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces a diversion
158:						
Dotta	Severe: seepage, slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope, droughty.	Slope
Searvar	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone slope, depth to r
159:						
Dudgen	Severe: cemented pan, seepage.	Severe: piping, ponding.	Severe: no water.	Cemented pan, percs slowly, ponding.	Cemented pan, percs slowly, ponding.	Erodes easi cemented p ponding.
Graven	Severe: seepage.	Severe: piping.	Severe: slow refill, cutbanks cave.	Deep to water	Cemented pan, percs slowly, slope.	Erodes easi cemented p too sandy.
160:						
Dudgen	Severe: cemented pan, seepage.	Severe: piping, ponding.	Severe: no water.	Cemented pan, percs slowly, ponding.	Cemented pan, percs slowly, ponding.	Erodes easi cemented p ponding.
Graven	Severe: seepage.	Severe: piping, wetness.	Severe: no water.	Flooding, cemented pan, percs slowly.	Percs slowly, slope, wetness.	Erodes easi cemented p wetness.
161 Esperanza	Moderate: cemented pan, seepage, slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Percs slowly, slope, soil blowing.	Percs slowl soil blowi
162 Esperanza	Moderate: cemented pan, seepage.	Moderate: piping, thin layer.	Severe: no water.	Deep to water	Percs slowly	Favorable
163 Esro	Moderate: seepage.	Severe: wetness.	Severe: slow refill.	Flooding, frost action.	Erodes easily, flooding, wetness.	Erodes easi wetness.
164:						
Etsel	Severe: slope, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth to r
Neuns	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth to r

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces a diversion
165, 166: Fiddler	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone slope, depth to r
Deven	Severe: slope, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Percs slowly, slope, depth to rock.	Percs slowl slope, depth to r
167, 168: Fiddler	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone slope, depth to r
Whitinger	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone slope, depth to r
169: Gardens	Severe: cemented pan, seepage.	Severe: ponding.	Severe: slow refill.	Flooding, cemented pan, ponding.	Erodes easily, cemented pan, ponding.	Erodes easi cemented p ponding.
Jacksback	Severe: seepage.	Severe: wetness.	Severe: slow refill.	Frost action	Wetness	Wetness
170, 171, 172, 173, 174: Gasper	Severe: seepage, slope.	Moderate: large stones.	Severe: no water.	Deep to water	Large stones, slope, soil blowing.	Large stone slope, soil blowi
Scarface	Severe: seepage, slope.	Moderate: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blowi
175: Gooval	Moderate: slope, depth to rock.	Severe: thin layer, wetness.	Severe: no water.	Large stones, percs slowly, depth to rock.	Large stones, slope, wetness.	Large stone wetness, depth to r
176: Gosch	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone slope.
177: Gosch	Severe: slope.	Moderate: large stones, piping, thin layer.	Severe: no water.	Deep to water	Slope, soil blowing, droughty.	Large stone slope, soil blowi

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces a diversion
177:						
Witcher	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blowi
178, 179, 180: Goulder	Severe: slope.	Moderate: large stones.	Severe: no water.	Deep to water	Large stones, slope.	Large stone slope.
181:						
Gullied land	Severe: slope.	Slight	Severe: no water.	Deep to water	Slope	Slope
Rock outcrop	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth to r
Mounthat	Severe: seepage, slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, soil blowing.	Large stone slope, depth to r
182, 183:						
Hambone	Severe: slope.	Moderate: large stones, thin layer.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone slope.
Boardburn	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blowi
184: Henhill	Moderate: seepage.	Severe: thin layer, wetness.	Severe: slow refill.	Flooding, frost action.	Flooding, wetness.	Erodes easi wetness.
185: Henhill	Slight	Severe: wetness.	Severe: slow refill.	Flooding, frost action.	Flooding, wetness.	Erodes easi wetness.
186:						
Hermit	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blowi
Canyoncreek	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Large stones, slope, soil blowing.	Large stone slope, soil blowi
187, 188, 189:						
Hunsinger	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone slope.

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces a diversion
187, 188, 189:						
Chirpchatter----	Severe: seepage, slope.	Moderate: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blowi
190------------- Jacksback	Severe: seepage.	Severe: wetness.	Severe: slow refill.	Frost action, slope.	Slope, wetness.	Wetness----
191, 192--------- Jadpor	Moderate: seepage.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, droughty.	Large stone
193:						
Jahjo-----------	Severe: slope, depth to rock.	Severe: piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Large stone slope, depth to r
Lava flows------	Severe: slope, depth to rock.	Slight---------	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to r
Loveness--------	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blowi
194:						
Jellico---------	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone slope, depth to r
Lava flows------	Severe: slope, depth to rock.	Slight---------	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to r
195, 196:						
Jellico---------	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone slope, depth to r
Splawn----------	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone slope, depth to r
197------------- Jellycamp	Severe: cemented pan, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Percs slowly, slope, depth to rock.	Erodes easi cemented p depth to r

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces a diversion
198, 199:						
Jellycamp-------	Severe: cemented pan, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Percs slowly, slope, depth to rock.	Cemented pa large stor depth to r
Karcal----------	Moderate: slope, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Large stones, slope, slow intake.	Large stone percs slow depth to r
200:						
Jellycamp-------	Severe: cemented pan, slope, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Percs slowly, slope, depth to rock.	Cemented pa slope, depth to r
Lassen----------	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Percs slowly, slope, slow intake.	Percs slowl slope, depth to r
Longcreek-------	Severe: slope, depth to rock.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone slope, depth to r
201:						
Jellycamp-------	Severe: cemented pan, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Percs slowly, slope, depth to rock.	Cemented pa large stor depth to r
Ollierivas------	Moderate: cemented pan, slope, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Percs slowly, slope, depth to rock.	Erodes easi cemented p depth to r
202:						
Jellycamp-------	Severe: cemented pan, slope, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Percs slowly, slope, depth to rock.	Large stone slope, depth to r
Ollierivas------	Moderate: cemented pan, slope, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Percs slowly, slope, depth to rock.	Erodes easi cemented p depth to r
Splawn----------	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone slope, depth to r

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces a diversion
203:						
Jellycamp	Severe: cemented pan, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Percs slowly, slope, depth to rock.	Erodes easi cemented p depth to r
Ricketts	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone slope, depth to r
Splawn	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone slope, depth to r
204:						
Jellycamp	Severe: cemented pan, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Cemented pa large ston depth to r
Vansickle	Severe: cemented pan, depth to rock.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Cemented pa large ston depth to r
205:						
Jellycamp	Severe: cemented pan, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Percs slowly, slope, droughty.	Cemented pa large ston depth to r
Vansickle	Severe: cemented pan, depth to rock.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Cemented pa large ston depth to r
206:						
Jellycamp	Severe: cemented pan, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Cemented pa large ston depth to r
Vansickle	Severe: cemented pan, depth to rock.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Cemented pa large ston depth to r
207, 208:						
Jimmerson loam	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Percs slowly, slope, soil blowing.	Slope, soil blowi
Jimmerson stony sandy loam	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Percs slowly, slope, soil blowing.	Percs slowl slope, soil blowi

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversi
209:						
Jimmerson stony loam----------	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Percs slowly, slope, soil blowing.	Slope, soil blo
Jimmerson loam--	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Percs slowly, slope, soil blowing.	Percs slo slope, soil blo
210:						
Karcal----------	Moderate: slope, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Large stones, slope, slow intake.	Large sto percs sl depth to
Cuppy-----------	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Percs slowly, slope, slow intake.	Cemented slope, depth to
211-------------- Keddie	Severe: seepage.	Severe: piping, ponding.	Severe: cutbanks cave.	Flooding, ponding.	Flooding, ponding.	Ponding--
212-------------- Keddie	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Favorable------	Wetness--------	Wetness--
213-------------- Keddie	Slight---------	Severe: wetness.	Severe: slow refill.	Flooding-------	Erodes easily, flooding, wetness.	Erodes ea wetness.
214:						
Kephart---------	Severe: seepage, slope.	Slight---------	Severe: no water.	Deep to water	Fast intake, slope.	Slope----
Quaking---------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Slope----
215-------------- Kettlebelly	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Slope----
216, 217:						
Kettlebelly-----	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope----------	Erodes ea slope.

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting- Drainage	Irrigation	Terraces diversi
216, 217:						
Neuns	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth to
218, 219:						
Kettlebelly	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope----
Neuns	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth to
220, 221, 222 Kilarc	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Percs slowly, slope, droughty.	Erodes ea percs sl slope.
223, 224:						
Kindig	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large sto slope.
Neuns	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth to
225:						
Lassen	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Percs slowly, slope, slow intake.	Percs slo slope, depth to
Cuppy	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Percs slowly, slope, slow intake.	Cemented slope, depth to
226 Lasvar	Moderate: cemented pan, seepage.	Severe: ponding.	Severe: no water.	Cemented pan, percs slowly, ponding.	Percs slowly, slow intake, ponding.	Erodes ea cemented ponding.
227:						
Lasvar	Moderate: cemented pan, seepage.	Severe: ponding.	Severe: no water.	Cemented pan, percs slowly, ponding.	Percs slowly, slow intake, ponding.	Erodes ea cemented ponding.
Pitvar	Moderate: cemented pan.	Severe: ponding.	Severe: no water.	Frost action, percs slowly, ponding.	Percs slowly, slow intake, ponding.	Percs slo ponding.

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces a diversion
228: Lava flows	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to r
229:						
Lava flows	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to r
Gassaway	Severe: slope, depth to rock.	Severe: piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to r
230:						
Lava flows	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to r
Neer	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, depth to rock.	Large stone slope, depth to r
231: Longbell	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty.	Slope, too sandy.
232:						
Longbell	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty.	Slope, too sandy.
Lava flows	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to r
233:						
Longbilly	Slight	Severe: excess sodium.	Severe: slow refill.	Deep to water	Erodes easily, percs slowly, droughty.	Erodes easi percs slow
Modoc	Moderate: cemented pan.	Severe: thin layer.	Severe: no water.	Deep to water	Cemented pan, soil blowing.	Cemented pa soil blowi
234:						
Longbilly	Slight	Severe: excess sodium.	Severe: slow refill.	Deep to water	Erodes easily, percs slowly, droughty.	Erodes easi percs slow

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces a diversion
234:						
Pit	Slight	Moderate: hard to pack, thin layer.	Severe: no water.	Deep to water	Flooding, percs slowly, slow intake.	Erodes easi percs slow
235:						
Longcreek	Severe: slope, depth to rock.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone slope, depth to r
Vansickle	Severe: cemented pan, slope, depth to rock.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone slope, depth to r
Rock outcrop	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth to r
236:						
Lonkey	Severe: slope.	Moderate: piping, thin layer.	Severe: no water.	Deep to water	Erodes easily, slope, depth to rock.	Erodes easi slope, depth to r
Datom	Severe: depth to rock.	Severe: hard to pack.	Severe: no water.	Deep to water	Percs slowly, slope, soil blowing.	Erodes easi soil blowi depth to r
237, 238, 239:						
Lonkey	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Percs slowly, slope, depth to rock.	Slope, depth to r
Malinda	Severe: slope, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to r
240, 241:						
Loveness	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blowi
Fleener	Severe: slope.	Slight	Severe: no water.	Deep to water	Slope, soil blowing, droughty.	Slope, soil blowi
242 Lunsford	Slight	Severe: wetness.	Severe: slow refill.	Flooding, frost action.	Flooding, wetness.	Wetness

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces diversi
243, 244, 245, 246: Malinda	Severe: slope, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to
247, 248: Matquaw	Severe: seepage.	Severe: seepage.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Flooding, wetness, droughty.	Erodes ea too sand wetness.
249:						
Medici	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blo
Blankout	Severe: seepage, slope.	Moderate: seepage, thin layer.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blo
250, 251: Medlake	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope	Slope
252: Modoc	Moderate: cemented pan.	Severe: thin layer.	Severe: no water.	Deep to water	Cemented pan	Cemented
253: Modoc	Moderate: cemented pan, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Cemented pan, slope, soil blowing.	Cemented soil blo
254:						
Mounthat	Severe: seepage, slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, soil blowing.	Large sto slope, depth to
Rock outcrop	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth to
255: Murken	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Large sto slope, depth to
256: Nanny	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty.	Favorable
257: Neer	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing, depth to rock.	Large sto slope, depth to

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces diversi
258, 259, 260:						
Neer	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing, depth to rock.	Large sto slope, depth to
Ponto	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blo
261:						
Neuns	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth to
Kettlebelly	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope----
262:						
Neuns	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth to
Kettlebelly	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope	Erodes ea slope.
263:						
Neuns	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth to
Kindig	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large sto slope.
264:						
Nikal	Severe: seepage.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, soil blowing, depth to rock.	Soil blow depth to
Chatterdown	Severe: seepage.	Moderate: seepage, piping, thin layer.	Severe: no water.	Deep to water	Slope, soil blowing.	Soil blow
Lava flows	Severe: depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Depth to
265 Nosoni	Slight	Severe: wetness.	Severe: slow refill.	Flooding	Flooding, wetness.	Wetness--

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces diversi
266, 267, 268:						
Obie	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope	Large sto slope.
Mounthat	Severe: seepage, slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, soil blowing.	Large sto slope, depth to
269 Odas	Severe: seepage.	Severe: piping, wetness.	Slight	Frost action	Wetness, droughty.	Wetness--
270:						
Oxendine	Severe: cemented pan, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Percs slowly, slope, depth to rock.	Cemented depth to
Lonkey	Moderate: slope, depth to rock.	Moderate: piping, thin layer.	Severe: no water.	Deep to water	Erodes easily, slope, depth to rock.	Erodes ea depth to
271:						
Oxendine	Severe: cemented pan.	Severe: thin layer.	Severe: no water.	Deep to water	Cemented pan, depth to rock.	Cemented depth to
Sweagert	Moderate: cemented pan.	Severe: thin layer.	Severe: no water.	Deep to water	Cemented pan, percs slowly.	Cemented
272:						
Oxendine	Severe: cemented pan.	Severe: thin layer.	Severe: no water.	Deep to water	Cemented pan, slope, depth to rock.	Cemented depth to
Sweagert	Moderate: cemented pan, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Cemented pan, percs slowly, slope.	Cemented
273:						
Oxendine	Severe: cemented pan.	Severe: thin layer.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Cemented large st depth to
Sweagert	Moderate: cemented pan, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Cemented pan, percs slowly, slope.	Cemented

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversi
274, 275, 276 Pastolla	Severe: seepage.	Severe: hard to pack, wetness.	Severe: slow refill.	Flooding, frost action, percs slowly.	Percs slowly, wetness, soil blowing.	Erodes ea wetness, soil blo
277, 278 Patburn	Slight	Moderate: wetness.	Severe: slow refill.	Flooding, percs slowly.	Flooding, percs slowly, wetness.	Percs slo wetness.
279 Pit	Slight	Moderate: hard to pack, thin layer.	Severe: no water.	Deep to water	Flooding, percs slowly, slow intake.	Erodes ea percs sl
280 Pit	Slight	Moderate: hard to pack, thin layer, wetness.	Severe: slow refill.	Flooding, frost action, percs slowly.	Percs slowly, slow intake, wetness.	Percs slo wetness.
281: Pits.						
Dumps.						
282 Pittville	Severe: seepage.	Moderate: piping, thin layer.	Severe: no water.	Deep to water	Soil blowing	Soil blow
283 Pittville	Severe: seepage.	Moderate: piping, thin layer.	Severe: no water.	Deep to water	Slope, soil blowing.	Soil blow
284, 285 Pittville	Severe: seepage, slope.	Moderate: piping, thin layer.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blo
286 Ponto	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blo
287: Ponto	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blo
Neer	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing, depth to rock.	Large sto slope, depth to

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversi
288:						
Ponto	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blo
Wyntoon	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Percs slowly, slope, soil blowing.	Erodes ea slope, soil blo
289:						
Quaking	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Slope----
Kephart	Severe: seepage, slope.	Slight	Severe: no water.	Deep to water	Fast intake, slope.	Slope----
290 Ravendale	Severe: seepage.	Severe: ponding.	Severe: no water.	Percs slowly, ponding.	Percs slowly, slow intake, ponding.	Percs slo ponding.
291 Revit	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing, depth to rock.	Slope, soil blo depth to
292, 293, 294:						
Ricketts	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large sto slope, depth to
Orhood	Severe: slope, depth to rock.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large sto slope, depth to
295:						
Ricketts	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing, droughty.	Slope, soil blo depth to
Sweagert	Severe: seepage.	Severe: thin layer, ponding.	Severe: no water.	Slope, ponding, depth to rock.	Slope, ponding, depth to rock.	Ponding, depth to
296:						
Ricketts	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing, droughty.	Slope, soil blo depth to

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces diversi
296:						
Searvar	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large sto slope, depth to
297, 298, 299:						
Rivalier	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, slope, depth to rock.	Large sto slope, depth to
300 Riverwash	Severe: seepage.	Severe: seepage, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Fast intake, wetness, droughty.	Large sto too sand wetness.
301:						
Roundbarn	Severe: seepage, slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large sto slope, soil blo
Said	Severe: slope.	Moderate: large stones, piping, thin layer.	Severe: no water.	Deep to water	Slope, soil blowing.	Large sto slope, soil blo
302:						
Rubble land	Severe: seepage, slope, depth to rock.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large sto slope, depth to
Argixerolls	Severe: slope, depth to rock.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large sto slope, depth to
Rock outcrop	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth to
303:						
Rubble land	Severe: seepage, slope, depth to rock.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large sto slope, depth to
Rock outcrop	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth to

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces a[nd] diversion[s]
304:						
Rubble land-----	Severe: seepage, slope, depth to rock.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone[s], slope, depth to r[ock].
Typic Vitrixerands---	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, too sandy, depth to r[ock].
305:						
Rubble land-----	Severe: seepage, slope, depth to rock.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone[s], slope, depth to r[ock].
Xerorthents-----	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Large stone[s], slope, depth to r[ock].
306, 307--------- Scarface	Severe: seepage, slope.	Moderate: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blowi[ng].
308:						
Scarface--------	Severe: seepage, slope.	Moderate: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blowi[ng].
Gasper----------	Severe: seepage, slope.	Moderate: large stones.	Severe: no water.	Deep to water	Large stones, slope, soil blowing.	Large stone[s], slope, soil blowi[ng].
309-------------- Shasta	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, soil blowing.	Too sandy, soil blowi[ng].
310-------------- Shastina	Severe: seepage.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones---	Large stone[s], too sandy.
311:						
Splawn----------	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone[s], slope, depth to r[ock].
Jellico---------	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone[s], slope, depth to r[ock].

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces a[nd] diversion[s]
312, 313: Stacher	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blowi[ng].
314: Stacher	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope	Slope
315: Stoner	Severe: slope.	Moderate: seepage, piping, thin layer.	Severe: no water.	Deep to water	Slope, droughty.	Slope
316:						
Stukel gravelly sandy loam	Severe: slope, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth to r[ock].
Stukel very cobbly sandy loam	Severe: slope, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone[s], slope, depth to r[ock].
317: Swanberger	Slight	Severe: hard to pack, ponding.	Severe: no water.	Frost action, percs slowly, ponding.	Percs slowly, slow intake, ponding.	Percs slowl[y], ponding.
318: Swanberger	Slight	Severe: hard to pack, ponding.	Severe: no water.	Frost action, percs slowly, ponding.	Percs slowly, ponding.	Percs slowl[y], ponding.
319: Sweagert	Moderate: cemented pan, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Cemented pan, percs slowly, slope.	Cemented pa[n]
320, 321: Tionesta	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, slope.	Large stone[s], slope.
322:						
Trojan	Severe: slope.	Moderate: large stones, piping, thin layer.	Severe: no water.	Deep to water	Slope, droughty.	Large stone[s], slope.
Erig	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stone[s], slope.

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversi
323-------------- Twinbuttes	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope----------	Slope----
324:						
Twinbuttes------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope----------	Slope----
Lava flows------	Severe: slope, depth to rock.	Slight---------	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to
325, 326, 327---- Wengler	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope----------	Large sto slope, too sand
328, 329:						
Whipp-----------	Severe: seepage.	Severe: piping, wetness.	Severe: no water.	Frost action, cemented pan, percs slowly.	Cemented pan, percs slowly, wetness.	Erodes ea cemented wetness.
Cupvar----------	Severe: seepage.	Severe: piping, ponding.	Severe: no water.	Cemented pan, percs slowly, ponding.	Percs slowly, slow intake, ponding.	Cemented ponding.
330-------------- Winnibulli	Slight---------	Severe: wetness.	Severe: slow refill.	Flooding-------	Flooding, percs slowly, wetness.	Wetness--
331-------------- Winnibulli	Severe: seepage.	Moderate: thin layer, wetness.	Severe: slow refill.	Flooding, percs slowly, slope.	Percs slowly, slope, wetness.	Percs slo wetness.
332:						
Winnibulli------	Moderate: slope.	Severe: wetness.	Severe: slow refill.	Flooding, slope.	Percs slowly, slope, wetness.	Wetness--
Burman----------	Severe: seepage.	Severe: thin layer, ponding.	Severe: no water.	Cemented pan, ponding.	Erodes easily, cemented pan, ponding.	Erodes ea cemented ponding.
333, 334:						
Witcher---------	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blo

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces diversi
333, 334:						
Gosch	Severe: slope.	Moderate: large stones, piping, thin layer.	Severe: no water.	Deep to water	Slope, soil blowing, droughty.	Large sto slope, soil blo
335, 336 Wyntoon	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Percs slowly, slope, soil blowing.	Erodes ea slope, soil blo
337:						
Wyntoon	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Percs slowly, slope, soil blowing.	Erodes ea slope, soil blo
Depner	Severe: seepage, slope.	Moderate: large stones, seepage, thin layer.	Severe: no water.	Deep to water	Large stones, slope, soil blowing.	Large sto slope, soil blo
338, 339:						
Zeugirdor	Severe: seepage, slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large sto slope.
Goulder	Severe: slope.	Moderate: large stones.	Severe: no water.	Deep to water	Large stones, slope.	Large sto slope.

Table 15.--Engineering Index Properties

(NP means nonplastic. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
101-------------- Adinot	0-2	Very gravelly sandy loam.	GM	A-1, A-2	10-15	45-60	40-55	30-45	15-30	0-14	NP
	2-11	Gravelly loam, gravelly clay loam.	GM-GC, GC, CL-ML, CL	A-4, A-6	0-10	55-80	50-75	45-65	35-55	25-40	5-15
	11-14	Very gravelly clay loam.	GC	A-7, A-2	0-10	35-60	30-55	25-50	20-40	40-50	15-25
	14-24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
102, 103--------- Adinot	0-2	Very cobbly sandy loam.	SM	A-2, A-4	35-50	75-85	70-80	50-60	30-40	---	NP
	2-6	Gravelly loam, loam.	GM-GC, GM, CL-ML, ML	A-4	0-10	65-95	60-90	55-75	40-60	25-35	5-10
	6-15	Clay loam, gravelly clay loam.	CL	A-6	0	65-95	60-90	55-85	50-70	30-40	10-15
	15-19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
104-------------- Adinot	0-2	Very stony sandy loam.	SM	A-2, A-4	15-20	75-85	70-80	50-60	30-40	---	NP
	2-5	Gravelly loam, loam.	GM-GC, GM, CL-ML, ML	A-4	0-10	65-95	60-90	55-75	40-60	25-35	5-10
	5-15	Clay loam, gravelly clay loam.	CL	A-6	0	65-95	60-90	55-85	50-70	30-40	10-15
	15-19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
105:											
Adinot----------	0-2	Very gravelly sandy loam.	GM	A-1, A-2	10-15	45-60	40-55	30-45	15-30	0-14	NP
	2-11	Gravelly loam, gravelly clay loam.	GM-GC, GC, CL-ML, CL	A-4, A-6	0-10	55-80	50-75	45-65	35-55	25-40	5-15
	11-14	Very gravelly clay loam.	GC	A-7, A-2	0-10	35-60	30-55	25-50	20-40	40-50	15-25
	14-24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Adinot, eroded--	0-2	Very gravelly sandy loam.	GM	A-1	0	40-55	35-50	30-40	15-25	0-14	NP
	2-8	Loam, clay loam	CL-ML, CL	A-4	0	90-100	85-90	75-85	55-65	25-35	5-10
	8-12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
106:											
Badenaugh-------	0-3	Very gravelly sandy loam.	GM	A-1, A-2	0-10	40-55	35-50	30-45	20-35	20-30	NP-5
	3-45	Very gravelly sandy clay loam, very cobbly sandy clay loam.	GC, SC	A-6, A-2	10-60	45-75	40-70	35-60	25-40	30-40	10-20
	45-60	Stratified extremely gravelly sandy loam to very cobbly sandy clay loam.	GM-GC, GC	A-2, A-1	35-55	40-60	30-55	25-50	15-30	25-35	5-15

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
106:											
Matquaw	0-12	Sandy loam	SM	A-2, A-4	0	95-100	95-100	50-70	30-50	20-30	NP-5
	12-33	Sandy loam	SM	A-2, A-4	0	95-100	95-100	50-70	30-50	20-30	NP-5
	33-45	Gravelly sandy loam.	SM, GM	A-2	0	65-80	60-75	40-55	25-35	20-30	NP-5
	45-60	Extremely cobbly sandy loam.	GM, SM	A-1, A-2	60-80	55-75	50-65	30-45	15-30	20-30	NP-5
	60-70	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
107:											
Bieber	0-5	Sandy loam	SM, SC-SM	A-4	0	80-100	75-95	50-70	35-50	20-30	NP-10
	5-11	Clay loam	CL	A-6	0	80-100	75-95	70-90	60-85	30-40	10-20
	11-17	Clay loam, clay	CL, CH	A-7	0	80-100	75-95	70-90	60-85	45-60	20-35
	17-60	Indurated	---	---	---	---	---	---	---	---	---
Esperanza	0-5	Loam	ML	A-4	0	85-100	80-100	70-95	50-75	30-40	5-10
	5-30	Clay loam, clay	CL	A-7, A-6	0	90-100	85-100	80-95	60-90	35-50	15-30
	30-53	Sandy clay loam, clay loam.	CL	A-6	0	90-100	85-90	75-90	50-55	30-35	10-15
	53-61	Cemented	---	---	---	---	---	---	---	---	---
108:											
Bieber	0-5	Gravelly sandy loam.	GM, SM, GM-GC, SC-SM	A-2, A-4	0-5	55-80	50-75	40-60	25-40	20-30	NP-10
	5-11	Clay loam	GC, CL, SC	A-6	0-5	55-90	50-85	45-70	40-60	30-40	10-20
	11-19	Clay, clay loam, gravelly clay.	CL, CH	A-7	0	65-95	60-90	55-85	50-80	45-60	20-35
	19-60	Indurated	---	---	---	---	---	---	---	---	---
Modoc	0-3	Sandy loam	SM	A-4	0	80-100	75-100	55-80	35-50	20-30	NP-5
	3-32	Sandy clay loam, clay loam.	SC, CL	A-6	0	80-100	75-100	60-90	35-65	30-40	10-20
	32-60	Indurated	---	---	---	---	---	---	---	---	---
109:											
Blankout	0-9	Coarse sandy loam	SM	A-2	0	90-100	80-95	50-60	25-35	---	NP
	9-18	Coarse sandy loam	SM	A-2, A-4	0	90-100	80-95	55-75	25-40	20-30	NP-5
	18-62	Gravelly coarse sandy loam.	SM	A-1, A-2	0-10	65-85	50-75	40-50	20-30	20-30	NP-5
	62-81	Extremely gravelly coarse sandy loam.	GM, GP-GM	A-1	15-30	35-45	25-35	15-25	10-20	20-30	NP-5
Medici	0-1	Coarse sandy loam	SM	A-2	0	95-100	85-90	50-65	25-35	0-14	NP
	1-19	Gravelly coarse sandy loam.	SM, GM	A-2, A-1	0	60-85	50-75	30-45	20-30	0-14	NP
	19-51	Very gravelly coarse sandy loam.	GM, SM, GP-GM, SP-SM	A-1	0	35-60	25-50	15-35	10-20	0-14	NP
	51-67	Very gravelly loam.	GM	A-1, A-2	0	35-60	25-50	20-45	15-30	0-14	NP
	67-75	Stratified coarse sand to loamy coarse sand.	SP-SM	A-1	0	85-100	75-95	35-45	5-10	0-14	NP

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
110:											
Boardburn-------	0-9	Sandy loam-------	SM	A-4	0	90-100	85-100	55-70	35-50	20-30	NP-5
	9-22	Loam-------------	CL-ML, CL	A-4	0	90-100	85-100	70-85	50-65	25-35	5-10
	22-40	Sandy clay loam	SC, CL	A-6	0	90-100	85-100	75-90	40-60	30-40	10-15
	40-50	Very gravelly sandy clay loam.	GC	A-2	0-5	35-55	25-50	20-45	15-35	30-40	10-15
	50-54	Weathered bedrock	---	---	---	---	---	---	---	---	---
Hambone---------	0-8	Gravelly sandy loam.	SM, GM	A-2, A-4	5-10	65-85	60-80	40-65	25-50	20-30	NP-5
	8-22	Very gravelly sandy clay loam.	GC, SC, GP-GC, SP-SC	A-2	5-10	35-70	25-60	20-50	10-30	30-40	10-15
	22-45	Very cobbly sandy clay loam, extremely cobbly sandy clay loam.	GC, SC	A-6, A-2	0-50	35-70	30-65	25-55	20-45	30-40	10-20
	45-49	Weathered bedrock	---	---	---	---	---	---	---	---	---
111, 112--------- Bollibokka	0-5	Loam-------------	ML, CL-ML, CL	A-4	0	80-95	75-95	65-85	50-65	25-35	5-10
	5-9	Clay loam--------	CL	A-6	0	80-95	75-95	70-90	60-75	30-40	10-20
	9-15	Gravelly clay loam.	SC, CL, GC	A-6	0-5	55-80	50-75	45-70	35-55	30-40	10-20
	15-19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
113------------- Bollibokka	0-5	Loam-------------	ML, CL-ML, CL	A-4	0	80-95	75-95	65-85	50-65	25-35	5-10
	5-9	Clay loam--------	CL	A-6	0	80-95	75-95	70-90	60-75	30-40	10-20
	9-15	Gravelly clay loam.	SC, CL, GC	A-6	0-5	55-80	50-75	45-70	35-55	30-40	10-20
	15-19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
114------------- Britton	0-3	Silty clay loam	MH	A-7	0	80-100	75-100	75-100	70-95	50-60	10-15
	3-17	Silty clay loam	MH	A-7	0-5	80-100	75-95	75-90	70-85	55-65	15-20
	17-21	Weathered bedrock	---	---	---	---	---	---	---	---	---
115------------- Britton	0-3	Silty clay loam	MH	A-7	0	80-100	75-100	75-100	70-95	50-60	10-15
	3-8	Silty clay loam	MH	A-7	0-5	80-100	75-95	75-90	70-85	55-65	15-20
	8-15	Gravelly silty clay loam.	MH	A-7	0-5	60-85	50-75	50-75	50-70	60-70	15-20
	15-19	Weathered bedrock	---	---	---	---	---	---	---	---	---
116------------- Britton	0-3	Silty clay loam	MH	A-7	0	80-100	75-100	75-100	70-95	50-60	10-15
	3-8	Silty clay loam	MH	A-7	0-5	80-100	75-95	75-90	70-85	55-65	15-20
	8-15	Gravelly silty clay loam.	MH	A-7	0-5	60-85	50-75	50-75	50-70	60-70	15-20
	15-19	Weathered bedrock	---	---	---	---	---	---	---	---	---
117, 118, 119:											
Bundora---------	0-14	Sandy loam-------	SM, SC-SM	A-2	0-5	85-95	80-95	50-65	25-30	15-25	NP-5
	14-29	Sandy loam, coarse sandy loam.	SM, SC-SM	A-2	0-5	85-100	80-100	50-70	25-35	15-25	NP-5
	29-63	Very gravelly sandy clay loam, very gravelly loam.	GM, GC, GM-GC	A-1, A-2-4	0-5	40-60	35-50	30-45	20-35	25-35	5-10

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
117, 118, 119:											
Goulder----------	0-7	Gravelly sandy loam.	SM, GM	A-1, A-2	0-15	55-80	50-75	30-50	15-30	20-25	NP-5
	7-17	Cobbly sandy loam	SC-SM, SM	A-2	15-40	85-95	80-90	45-65	25-35	20-30	NP-10
	17-27	Cobbly loam------	CL-ML, ML	A-4	15-40	85-95	80-90	65-85	50-70	20-30	NP-10
	27-41	Very cobbly clay loam, very cobbly sandy clay loam.	SC, CL, GC	A-6, A-2	15-35	60-85	55-80	45-70	25-65	30-40	10-15
	41-58	Very gravelly clay loam, very gravelly sandy clay loam, extremely gravelly clay loam.	SC, GC	A-6, A-2	0-15	30-65	25-60	20-50	10-45	30-40	10-15
	58-64	Very bouldery clay loam.	CL	A-6	10-30	75-90	70-85	65-80	50-70	30-40	10-15
120-------------- Bunselmeier	0-12	Very gravelly sandy loam.	GM	A-1	0-15	35-55	30-50	20-35	15-25	20-30	NP-5
	12-25	Very gravelly sandy clay loam.	GM	A-2	5-15	40-60	35-55	30-50	15-25	30-40	5-10
	25-48	Extremely gravelly sandy loam.	GM, GP-GM	A-1	5-15	25-40	20-35	15-30	5-15	20-30	NP-5
	48-62	Cinders----------	---	---	---	---	---	---	---	---	---
121:											
Burman----------	0-3	Loam------------	CL-ML, CL	A-4	0	100	100	85-95	80-90	25-30	5-10
	3-7	Clay loam--------	CL	A-6	0	100	100	90-100	85-95	30-35	10-15
	7-11	Clay loam--------	ML, CL	A-6	0	100	100	90-100	85-95	35-40	10-15
	11-29	Clay-------------	CL, CH	A-7	0	100	100	90-100	85-95	45-60	25-40
	29-72	Cemented---------	---	---	---	---	---	---	---	---	---
Lasvar----------	0-3	Clay-------------	CL, CH	A-7	0	100	100	90-100	75-95	45-55	25-35
	3-28	Clay-------------	CL, CH	A-7	0	100	100	90-100	75-95	45-55	25-35
	28-31	Silt loam, silty clay loam.	CL	A-6	0	100	100	90-100	70-95	30-35	10-15
	31-60	Indurated--------	---	---	---	---	---	---	---	---	---
122:											
Burney----------	0-8	Gravelly loam----	SM, ML, GM	A-4	0-5	70-80	65-75	55-70	45-60	25-35	NP-10
	8-38	Gravelly loam, gravelly clay loam.	ML, SM, GM	A-6, A-7	0-5	65-85	55-75	50-70	45-65	35-45	10-15
	38-59	Very cobbly clay loam, very stony clay loam.	CL	A-6, A-7	0-65	75-95	70-90	65-85	55-70	35-45	15-20
	59-63	Weathered bedrock	---	---	---	---	---	---	---	---	---
Arkright--------	0-10	Gravelly loam----	SM, ML, GM	A-4	0-5	70-80	65-75	55-70	45-60	25-35	NP-10
	10-14	Gravelly loam, gravelly clay loam.	ML, SM, GM	A-6, A-7	5-10	60-85	55-80	45-70	35-60	35-45	10-15
	14-24	Cobbly loam, cobbly clay loam.	ML	A-6, A-7	10-40	75-95	70-90	60-80	50-65	35-45	10-15
	24-28	Weathered bedrock	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
123:											
Canyoncreek-----	0-19	Sandy loam-------	SM	A-4	0	85-100	75-100	50-70	35-50	20-30	NP-5
	19-43	Very stony loam, very cobbly loam, extremely cobbly loam.	SC-SM, SM, GM-GC, GM	A-2, A-4	30-55	50-90	40-80	35-65	25-50	25-35	5-10
	43-58	Extremely gravelly loam, very gravelly loam.	GP-GM, GM-GC, GM, GC	A-1, A-2	0-5	20-60	10-50	5-45	5-35	25-35	5-10
	58-68	Weathered bedrock	---	---	---	---	---	---	---	---	---
Hermit----------	0-17	Sandy loam-------	SM	A-4	0	85-100	75-100	50-70	35-50	20-30	NP-5
	17-28	Sandy loam, loam	SM, SC-SM, ML, CL-ML	A-4	0	85-100	75-100	50-80	35-55	25-35	5-10
	28-40	Very gravelly loam.	GM, GM-GC, GC	A-2, A-1	0-5	35-60	25-50	20-40	15-35	25-35	5-10
	40-44	Weathered bedrock	---	---	---	---	---	---	---	---	---
124:											
Canyoncreek-----	0-14	Sandy loam-------	SM	A-4	0	85-100	75-100	50-70	35-50	20-30	NP-5
	14-36	Very stony loam, very cobbly loam, extremely cobbly loam.	SC-SM, SM, GM-GC, GM	A-2, A-4	30-55	50-90	40-80	35-65	25-50	25-35	5-10
	36-55	Extremely gravelly loam, very gravelly loam.	GP-GM, GM-GC, GM, GC	A-1, A-2	0-5	20-60	10-50	5-45	5-35	25-35	5-10
	55-59	Weathered bedrock	---	---	---	---	---	---	---	---	---
Hermit----------	0-17	Sandy loam-------	SM	A-4	0	85-100	75-100	50-70	35-50	20-30	NP-5
	17-28	Sandy loam, loam	SM, SC-SM, ML, CL-ML	A-4	0	85-100	75-100	50-80	35-55	25-35	5-10
	28-40	Very gravelly loam.	GM, GM-GC, GC	A-2, A-1	0-5	35-60	25-50	20-40	15-35	25-35	5-10
	40-44	Weathered bedrock	---	---	---	---	---	---	---	---	---
125, 126, 127---- Carberry	0-5	Gravelly fine sandy loam.	SM, GM, GM-GC, SC-SM	A-1, A-2	0	55-80	50-75	30-45	15-30	20-25	NP-5
	5-12	Gravelly fine sandy loam.	SM, GM, GM-GC, SC-SM	A-1, A-2	0	55-80	50-75	30-45	15-30	20-25	NP-5
	12-17	Very gravelly fine sandy loam.	SM, GM, GM-GC, GP-GM	A-1	10-25	35-60	30-55	20-35	10-25	20-25	NP-5
	17-50	Extremely gravelly loam.	GW, GW-GM, GP, GP-GM	A-1	0-25	15-35	10-25	5-20	0-10	25-30	NP-5
	50-54	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
128, 129:											
Carberry--------	0-9	Gravelly fine sandy loam.	SM, GM, GM-GC, SC-SM	A-1, A-2	0	55-80	50-75	30-45	15-30	20-25	NP-5
	9-19	Very gravelly fine sandy loam.	SM, GM, GM-GC, GP-GM	A-1	10-25	35-60	30-55	20-35	10-25	20-25	NP-5
	19-60	Extremely gravelly loam.	GW, GW-GM, GP, GP-GM	A-1	0-25	15-35	10-25	5-20	0-10	25-30	NP-5
	60-64	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
128, 129:											
Ponto-----------	0-6	Sandy loam-------	SM	A-4	0-5	80-100	75-100	50-75	35-50	20-30	NP-5
	6-80	Sandy loam, loam	SM, ML	A-4	0-10	80-100	75-95	50-80	35-60	20-30	NP-5
130:											
Carberry--------	0-9	Gravelly fine sandy loam.	SM, GM, GM-GC, SC-SM	A-1, A-2	0	55-80	50-75	30-45	15-30	20-25	NP-5
	9-19	Very gravelly fine sandy loam.	SM, GM, GM-GC, GP-GM	A-1	10-25	35-60	30-55	20-35	10-25	20-25	NP-5
	19-60	Extremely gravelly loam.	GW, GW-GM, GP, GP-GM	A-1	0-25	15-35	10-25	5-20	0-10	25-30	NP-5
	60-64	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lava flows------	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
131-------------- Chalkford	0-9	Loam-------------	ML, CL-ML	A-4	0	100	95-100	75-85	60-70	25-35	5-10
	9-35	Clay loam, silty clay loam.	CL	A-6	0	100	95-100	85-95	70-80	30-40	10-15
	35-62	Clay loam, silty clay loam, clay.	CL	A-6, A-7	0	100	95-100	85-95	70-85	35-45	15-20
132:											
Chatterdown-----	0-15	Fine sandy loam	SM	A-4	0-5	85-100	75-95	50-70	35-45	---	NP
	15-30	Sandy loam, fine sandy loam, gravelly fine sandy loam.	SM, GM	A-2, A-4	0-10	60-90	50-80	40-70	25-40	---	NP
	30-47	Sandy loam, fine sandy loam, gravelly sandy loam.	SM, GM	A-2, A-4	0-10	60-90	50-80	40-70	25-40	---	NP
	47-63	Sandy loam, gravelly sandy loam.	SM, GM	A-2, A-4	5-20	65-90	60-85	40-70	25-40	---	NP
	63-67	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Nikal-----------	0-10	Gravelly sandy loam.	SM, GM	A-2	0-5	65-80	60-75	30-40	25-35	0-14	NP
	10-36	Very gravelly sandy loam, gravelly sandy loam.	GM, SM	A-1, A-2	5-20	45-75	35-70	30-55	20-35	0-14	NP
	36-40	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
133:											
Chirpchatter----	0-7	Sandy loam-------	SM	A-4	0	80-100	75-100	50-70	35-50	20-30	NP-5
	7-32	Sandy clay loam	SC-SM, SC	A-4, A-6	0	80-100	75-95	65-80	35-50	25-35	5-15
	32-70	Gravelly sandy loam.	SM	A-2	5-15	65-80	60-75	40-50	25-30	20-30	NP-5

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
133:											
Hunsinger-------	0-13	Gravelly sandy loam.	SM, GM	A-2	0-10	55-80	50-75	35-60	25-35	20-30	NP-5
	13-26	Very cobbly sandy clay loam, very gravelly sandy clay loam.	GC	A-2	15-65	35-60	30-55	25-40	15-35	30-40	10-20
	26-42	Cobbly sandy clay loam, very cobbly sandy clay loam.	GC, SC	A-2, A-6	25-45	45-75	40-70	35-60	25-45	30-40	10-20
	42-46	Weathered bedrock	---	---	---	---	---	---	---	---	---
134------------- Coneward	0-8	Loamy sand-------	SM	A-2	0	100	100	50-75	15-30	---	NP
	8-55	Loamy sand-------	SM	A-2	0	100	100	50-75	15-30	---	NP
	55-60	Loamy sand-------	SM	A-2	0	100	100	50-75	15-30	---	NP
135, 136--------- Coneward	0-8	Loamy sand-------	SM	A-2	0	100	100	50-75	15-30	---	NP
	8-50	Loamy sand-------	SM	A-2	0	100	100	50-75	15-30	---	NP
	50-60	Loamy sand-------	SM	A-2	0	100	100	50-75	15-30	---	NP
137:											
Coneward--------	0-8	Loamy sand-------	SM	A-2	0	100	100	50-75	15-30	---	NP
	8-50	Loamy sand-------	SM	A-2	0	100	100	50-75	15-30	---	NP
	50-60	Cobbly loamy sand, stony loamy sand, loamy sand.	SM	A-1, A-2	0-35	95-100	90-100	45-70	15-30	---	NP
Lava flows------	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
138------------- Cupvar	0-21	Silty clay-------	CH	A-7	0	100	100	95-100	90-95	50-65	25-40
	21-25	Cemented---------	---	---	---	---	---	---	---	---	NP
	25-64	Fine sandy loam, sandy loam, sandy clay loam.	SM, SC-SM, SC	A-4	0	100	95-100	60-70	35-50	10-20	NP-10
139, 140, 141---- Danhunt	0-2	Gravelly sandy loam.	SM, SC-SM	A-1	0	65-85	55-75	35-45	15-25	20-25	NP-5
	2-11	Gravelly sandy loam, gravelly coarse sandy loam.	SM, SC-SM	A-2, A-1	0-15	75-85	65-75	40-50	20-30	20-25	NP-5
	11-22	Very gravelly coarse sandy loam, very gravelly sandy loam.	SC-SM, GM-GC, GM, SM	A-1	0-15	40-65	30-55	15-35	10-20	20-25	NP-5
	22-38	Very gravelly loamy coarse sand.	SP-SM, SM, GM, GP-GM	A-1	0-15	15-65	5-55	5-35	5-15	20-25	NP-5
	38-61	Extremely gravelly loamy coarse sand, extremely gravelly coarse sandy loam.	GP-GM	A-1	0-15	15-35	5-25	5-15	5-10	20-25	NP-5
	61-65	Weathered bedrock	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
142-------------- Daphnedale	0-3	Loam-------------	CL-ML, ML, CL	A-4	0-10	90-100	85-95	70-85	50-65	25-35	5-10
	3-25	Clay loam, clay	CL, CH	A-7	0-5	90-100	85-100	80-95	60-90	40-55	15-30
	25-36	Loam, clay loam, sandy clay loam.	CL-ML, CL	A-4, A-6	0-5	90-100	85-95	70-90	50-70	25-40	5-15
	36-40	Weathered bedrock	---	---	---	---	---	---	---	---	---
143-------------- Datom	0-3	Clay loam--------	MH	A-7	0-5	100	95-100	90-100	80-85	50-60	10-15
	3-12	Silty clay-------	MH	A-7	0-5	100	95-100	90-100	85-90	50-60	15-20
	12-16	Silty clay-------	MH	A-7	0-5	100	80-95	75-95	65-90	60-70	20-25
	16-20	Weathered bedrock	---	---	---	---	---	---	---	---	---
144-------------- Dekkas	0-3	Fine sandy loam	SM, SC-SM	A-2, A-4	0	80-100	75-100	55-85	25-40	20-25	NP-5
	3-34	Loamy sand, loamy coarse sand.	SM, SC-SM	A-2, A-1	0	80-100	75-90	40-65	15-25	20-25	NP-5
	34-43	Loamy sand-------	SM, SC-SM	A-2, A-1	0	80-100	75-90	40-70	15-25	20-25	NP-5
	43-54	Gravelly loamy sand, gravelly loamy coarse sand.	SM, SC-SM, SP-SM	A-1, A-2	0-15	65-85	60-75	30-55	10-25	20-25	NP-5
	54-64	Very gravelly loamy sand, very gravelly loamy coarse sand.	GM, GW-GM, SM, SP-SM	A-1	10-25	45-60	35-55	25-35	5-15	20-25	NP-5
	64-80	Very cobbly sandy clay loam.	SC, GC	A-2, A-6	25-30	55-75	50-70	40-60	20-40	30-35	10-15
145, 146--------- Depner	0-16	Gravelly sandy loam.	SM	A-1, A-2	0-10	80-95	55-75	35-65	20-30	15-25	NP-5
	16-48	Very cobbly sandy loam, very cobbly loam.	SM, SC, SC-SM	A-2, A-1	15-50	65-70	55-65	20-50	20-35	20-30	NP-10
	48-52	Weathered bedrock	---	---	---	---	---	---	---	---	---
147, 148, 149---- Deven	0-4	Very cobbly loam	GM-GC, GM, SC-SM, SM	A-4	0-50	55-80	50-75	45-65	35-50	25-35	5-10
	4-15	Clay, clay loam	CL, CH	A-7	0	80-95	75-90	70-85	60-80	40-60	20-35
	15-19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
150:											
Dosa------------	0-4	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	35-40	15-20
	4-28	Clay, silty clay	CL, CH	A-7	0	95-100	85-100	75-90	65-80	45-55	25-35
	28-32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Burman----------	0-8	Loam-------------	ML, CL-ML, CL	A-4	0	95-100	90-100	80-90	50-70	25-35	5-10
	8-33	Clay loam--------	ML, CL	A-6, A-7	0	100	95-100	90-95	70-80	35-45	10-20
	33-39	Indurated--------	---	---	---	---	---	---	---	---	---
	39-72	Stratified sandy loam to silt loam.	SM, SC-SM	A-4	0	90-100	80-100	50-90	35-50	20-25	NP-5
151-------------- Dotta	0-13	Loam-------------	ML	A-4	0	80-100	75-100	60-85	50-75	25-35	NP-10
	13-41	Sandy clay loam	SC	A-6	0	80-100	75-100	60-85	35-50	30-40	10-15
	41-68	Gravelly sandy clay loam.	GC, SC	A-2	0-5	55-80	50-75	40-70	25-35	30-40	10-15

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
152-------------- Dotta	0-16	Sandy loam-------	SM	A-4	0	80-100	75-100	50-70	35-50	20-30	NP-5
	16-47	Sandy clay loam, loam.	SC, CL	A-6	0	80-100	75-100	60-85	35-60	30-40	10-15
	47-75	Sandy loam, coarse sandy loam.	SM	A-2, A-4	0	80-100	75-100	40-70	25-50	20-30	NP-5
153, 154, 155---- Dotta	0-17	Sandy loam-------	SM	A-4	0	80-100	75-100	50-70	35-50	20-30	NP-5
	17-29	Sandy clay loam, loam.	SC, CL	A-6	0	80-100	75-100	60-85	35-60	30-40	10-15
	29-72	Sandy loam, coarse sandy loam.	SM	A-2, A-4	0	80-100	75-100	40-70	25-50	20-30	NP-5
156:											
Dotta-----------	0-16	Sandy loam-------	SM	A-4	0	80-100	75-100	50-70	35-50	20-30	NP-5
	16-47	Sandy clay loam, loam.	SC, CL	A-6	0	80-100	75-100	60-85	35-60	30-40	10-15
	47-75	Sandy loam, coarse sandy loam.	SM	A-2, A-4	0	80-100	75-100	40-70	25-50	20-30	NP-5
Esperanza-------	0-5	Loam-------------	ML	A-4	0	85-100	80-100	70-95	50-75	30-40	5-10
	5-53	Clay loam, clay	CL	A-7, A-6	0	90-100	85-100	80-95	60-90	35-50	15-30
	53-58	Stratified sandy loam to loamy sand.	SM, SC-SM	A-2	0	85-100	80-90	50-60	15-30	15-25	NP-5
	58-61	Cemented---------	---	---	---	---	---	---	---	---	---
157:											
Dotta-----------	0-16	Sandy loam-------	SM	A-4	0	80-100	75-100	50-70	35-50	20-30	NP-5
	16-47	Sandy clay loam, loam.	SC, CL	A-6	0	80-100	75-100	60-85	35-60	30-40	10-15
	47-75	Sandy loam, coarse sandy loam.	SM	A-2, A-4	0	80-100	75-100	40-70	25-50	20-30	NP-5
Ricketts--------	0-10	Very cobbly loam	SC-SM, SM, GM-GC, GM	A-4	30-45	65-75	60-70	45-60	35-50	25-35	5-10
	10-26	Very cobbly loam, very cobbly clay loam.	SC, GC	A-6	40-60	55-75	50-70	45-60	35-50	30-40	10-15
	26-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
158:											
Dotta-----------	0-12	Gravelly loam----	SM, GM	A-2, A-4	0-5	55-80	50-75	40-70	30-50	20-35	NP-10
	12-54	Gravelly sandy clay loam, gravelly loam.	SC, GC	A-6	0-5	55-80	50-75	40-70	35-50	30-40	10-15
	54-64	Gravelly sandy loam, gravelly coarse sandy loam.	SM, GM	A-1, A-2	0-5	55-80	50-75	30-60	15-30	20-30	NP-5
Searvar---------	0-6	Gravelly loam----	GM, SM	A-4	0-5	55-80	50-75	45-65	35-50	25-35	NP-10
	6-18	Very cobbly loam	SM, GM	A-4	40-60	60-80	55-75	50-65	35-50	25-35	NP-10
	18-28	Very cobbly loam	SM, SC-SM, GM, GM-GC	A-4	40-60	60-80	55-75	50-65	35-50	25-35	5-10
	28-53	Weathered bedrock	---	---	---	---	---	---	---	---	---
	53-63	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
159:											
Dudgen----------	0-4	Loam------------	ML, CL-ML, CL	A-4	0	95-100	90-100	80-90	50-70	25-35	5-10
	4-8	Clay loam--------	ML, CL	A-6, A-7	0	100	95-100	90-95	70-80	35-45	10-20
	8-15	Clay-------------	CL, CH	A-7	0	100	95-100	90-100	70-90	45-60	25-35
	15-19	Indurated--------	---	---	---	---	---	---	---	---	---
	19-37	Stratified sandy loam to silt loam.	SM, SC-SM	A-4	0	90-100	80-100	50-90	35-50	20-25	NP-5
	37-99	Stratified loamy sand to sandy loam.	SM	A-2	0	90-100	80-100	50-70	20-35	0-14	NP
Graven----------	0-9	Silt loam--------	ML	A-4	0	95-100	90-100	80-90	55-70	25-35	NP-10
	9-14	Silt loam, loam, clay loam.	CL	A-6	0	100	95-100	90-95	60-80	30-40	10-20
	14-23	Clay loam, clay	CL, CH	A-7	0	100	95-100	90-100	70-90	40-55	20-30
	23-29	Indurated--------	---	---	---	---	---	---	---	---	---
	29-35	Stratified sandy loam to silt loam.	SM, ML	A-4	0	90-100	80-100	50-85	40-60	20-35	NP-10
	35-64	Stratified loamy sand to silt loam.	SM	A-2, A-4	0	90-100	80-100	50-70	25-50	20-30	NP-5
160:											
Dudgen----------	0-5	Loam------------	ML, CL-ML, CL	A-4	0	95-100	90-100	80-90	50-70	25-35	5-10
	5-11	Clay loam--------	ML, CL	A-6, A-7	0	100	95-100	90-95	70-80	35-45	10-20
	11-16	Clay-------------	CL, CH	A-7	0	100	95-100	90-100	70-90	45-60	25-35
	16-19	Indurated--------	---	---	---	---	---	---	---	---	---
	19-60	Stratified loamy sand to sandy loam.	SM	A-2	0	90-100	80-100	50-70	20-35	0-14	NP
Graven----------	0-2	Silt loam--------	ML	A-4	0	95-100	90-100	80-90	55-70	25-35	NP-10
	2-12	Silt loam, loam, clay loam.	CL	A-6	0	100	95-100	90-95	60-80	30-40	10-20
	12-20	Clay loam, clay	CL, CH	A-7	0	100	95-100	90-100	70-90	40-55	20-30
	20-24	Indurated--------	---	---	---	---	---	---	---	---	---
	24-60	Stratified loamy sand to silt loam.	SM	A-2, A-4	0	90-100	80-100	50-70	25-50	20-30	NP-5
161------------- Esperanza	0-6	Sandy loam-------	SM	A-4	0	85-100	80-100	60-85	35-50	20-30	NP-5
	6-30	Clay loam, clay	CL	A-7, A-6	0	90-100	85-100	80-95	60-90	35-50	15-30
	30-44	Sandy clay loam, clay loam.	CL	A-6	0	90-100	85-90	75-90	50-55	30-35	10-15
	44-58	Stratified sandy loam to loamy sand.	SM, SC-SM	A-2	0	85-100	80-90	50-60	15-30	15-25	NP-5
	58-61	Cemented---------	---	---	---	---	---	---	---	---	---
162------------- Esperanza	0-5	Loam------------	ML	A-4	0	85-100	80-100	70-95	50-75	30-40	5-10
	5-30	Clay loam, clay	CL	A-7, A-6	0	90-100	85-100	80-95	60-90	35-50	15-30
	30-53	Sandy clay loam, clay loam.	CL	A-6	0	90-100	85-90	75-90	50-55	30-35	10-15
	53-58	Stratified sandy loam to loamy sand.	SM, SC-SM	A-2	0	85-100	80-90	50-60	15-30	15-25	NP-5
	58-60	Cemented---------	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
163-------------- Esro	0-22	Silt loam--------	CL-ML	A-4	0	100	100	90-100	70-90	25-30	5-10
	22-40	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	30-35	10-15
	40-43	Sandy clay loam, clay loam.	SC	A-2, A-6	0	90-100	85-100	65-90	30-50	25-30	10-15
	43-60	Very gravelly sandy clay loam.	GC	A-2	0	30-55	25-50	20-45	10-30	25-30	10-15
164:											
Etsel-----------	0-2	Very gravelly sandy loam.	GM-GC, GC	A-1, A-2	0-5	35-55	30-50	20-45	15-35	20-30	5-10
	2-9	Very gravelly loam, very gravelly sandy loam.	GM-GC, GC	A-1, A-2	0-5	35-55	30-50	20-45	15-35	20-30	5-10
	9-13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Neuns-----------	0-7	Gravelly sandy loam.	SM, GM, GM-GC, SC-SM	A-2	0-5	55-80	50-75	30-50	25-35	15-25	NP-5
	7-32	Very gravelly sandy loam, very gravelly loam.	GM, GP-GM, GM-GC	A-1, A-2	0-10	30-55	25-50	20-45	10-35	15-25	NP-5
	32-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
165, 166:											
Fiddler---------	0-5	Very cobbly loam	CL-ML, ML, CL	A-4	25-55	95-100	90-100	80-90	55-75	25-35	5-10
	5-31	Very cobbly clay loam, very cobbly clay.	CL, CH	A-7	40-50	75-90	70-85	65-75	50-65	40-60	20-35
	31-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Deven-----------	0-4	Very cobbly loam	GM-GC, GM, SC-SM, SM	A-4	0-50	55-80	50-75	45-65	35-50	25-35	5-10
	4-15	Clay, clay loam	CL, CH	A-7	0	80-95	75-90	70-85	60-80	40-60	20-35
	15-19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
167:											
Fiddler---------	0-5	Very cobbly loam	CL-ML, ML, CL	A-4	25-55	95-100	90-100	80-90	55-75	25-35	5-10
	5-31	Very cobbly clay loam, very cobbly clay.	CL, CH	A-7	40-50	75-90	70-85	65-75	50-65	40-60	20-35
	31-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Whitinger-------	0-10	Stony loam-------	ML, CL-ML, CL	A-4	0-5	80-95	75-90	70-80	50-65	25-35	5-10
	10-30	Very cobbly clay loam, very stony clay loam.	GC, SC	A-6	25-40	55-80	50-75	45-60	35-50	30-40	10-20
	30-34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
168:											
Fiddler---------	0-5	Very cobbly loam	CL-ML, ML, CL	A-4	25-55	95-100	90-100	80-90	55-75	25-35	5-10
	5-31	Very cobbly clay loam, very cobbly clay.	CL, CH	A-7	40-50	75-90	70-85	65-75	50-65	40-60	20-35
	31-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Whitinger-------	0-10	Stony loam-------	ML, CL-ML, CL	A-4	0-5	80-95	75-90	70-80	50-65	25-35	5-10
	10-35	Very cobbly clay loam, very stony clay loam.	GC, SC	A-6	25-40	55-80	50-75	45-60	35-50	30-40	10-20
	35-39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
169:											
Gardens---------	0-3	Loam-------------	CL-ML, CL	A-4	0	100	100	85-95	60-75	25-30	5-10
	3-7	Clay loam--------	CL	A-6	0	85-100	75-100	65-90	55-80	30-35	10-15
	7-15	Sandy clay loam	SC	A-6	0	85-100	75-100	60-90	35-50	30-35	10-15
	15-30	Sandy clay loam, sandy loam.	SC-SM, SC	A-2, A-4	0	95-100	85-100	50-90	25-50	25-30	5-10
	30-33	Very gravelly sandy loam.	GM-GC, GC, GP-GC	A-1, A-2	0	30-50	25-50	15-30	10-20	25-30	5-10
	33-62	Stratified fine sandy loam to sandy clay loam.	SC-SM, SC	A-2, A-4	0	95-100	85-100	50-90	25-50	25-30	5-10
Jacksback-------	0-12	Loam-------------	SC-SM, CL-ML, SC, CL	A-4	0	90-95	85-90	75-80	45-70	25-30	5-10
	12-21	Loam-------------	SC, CL	A-6	0	90-95	85-90	75-80	45-70	25-30	10-15
	21-42	Sandy clay loam	SC	A-6	0	90-95	85-90	65-80	35-50	30-35	10-15
	42-52	Sandy loam-------	SC-SM, SC	A-2	0	90-95	85-90	55-60	25-35	20-25	5-10
	52-75	Very fine sandy loam, coarse sandy loam, sandy loam.	SC-SM, SC	A-2	0	90-95	85-90	55-60	25-35	20-25	5-10
	75-80	Silt loam--------	CL-ML, CL	A-4	0	90-95	85-90	75-90	65-80	20-25	5-10
170, 171:											
Gasper----------	0-4	Gravelly sandy loam.	SM	A-2	10-15	80-90	75-85	50-60	25-35	20-30	NP-5
	4-16	Gravelly sandy loam.	SC-SM, SC	A-2	10-15	80-90	75-85	50-60	25-35	20-30	5-10
	16-38	Very cobbly sandy loam, extremely stony sandy loam.	SC-SM, SC	A-2	20-45	70-80	65-75	45-55	25-35	20-30	5-10
	38-60	Very cobbly sandy clay loam.	SC, GC	A-2	15-25	60-75	55-70	50-65	25-35	25-35	10-15
Scarface--------	0-16	Sandy loam-------	SM	A-4	0	85-95	75-85	50-60	35-50	20-30	NP-5
	16-24	Sandy loam-------	SM	A-4	0	85-95	75-85	50-60	35-50	20-30	NP-5
	24-37	Gravelly sandy clay loam.	SC-SM, SM	A-2	0	80-85	70-75	60-70	25-35	25-35	5-10
	37-52	Gravelly sandy clay loam.	SC-SM, SM	A-2	10-15	75-85	65-75	50-60	25-35	25-35	5-10
	52-84	Gravelly sandy clay loam, gravelly clay loam.	SC	A-2, A-6	0	60-80	50-75	45-60	25-50	30-40	10-15

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
172:											
Gasper----------	0-5	Gravelly sandy loam.	SM	A-2	10-15	80-90	75-85	50-60	25-35	20-30	NP-5
	5-44	Very cobbly sandy loam, extremely stony sandy loam.	SC-SM, SC	A-2	20-45	70-80	65-75	45-55	25-35	20-30	5-10
	44-61	Very cobbly sandy clay loam.	SC, GC	A-2	15-25	60-75	55-70	50-65	25-35	25-35	10-15
Scarface--------	0-5	Sandy loam-------	SM	A-4	0	85-95	75-85	50-60	35-50	20-30	NP-5
	5-30	Sandy loam-------	SM	A-4	0	85-95	75-85	50-60	35-50	20-30	NP-5
	30-45	Gravelly sandy clay loam.	SC-SM, SM	A-2	0	80-85	70-75	60-70	25-35	25-35	5-10
	45-61	Gravelly sandy clay loam.	SC-SM, SM	A-2	10-15	75-85	65-75	50-60	25-35	25-35	5-10
173, 174:											
Gasper----------	0-5	Gravelly sandy loam.	SM	A-2	10-15	80-90	75-85	50-60	25-35	20-30	NP-5
	5-44	Very cobbly sandy loam, extremely stony sandy loam.	SC-SM, SC	A-2	20-45	70-80	65-75	45-55	25-35	20-30	5-10
	44-61	Very cobbly sandy clay loam.	SC, GC	A-2	15-25	60-75	55-70	50-65	25-35	25-35	10-15
Scarface--------	0-5	Sandy loam-------	SM	A-4	0	85-95	75-85	50-60	35-50	20-30	NP-5
	5-30	Sandy loam-------	SM	A-4	0	85-95	75-85	50-60	35-50	20-30	NP-5
	30-45	Gravelly sandy clay loam.	SC-SM, SM	A-2	0	80-85	70-75	60-70	25-35	25-35	5-10
	45-61	Gravelly sandy clay loam, gravelly clay loam.	SC	A-2, A-6	0	60-80	50-75	45-60	25-50	30-40	10-15
175-------------- Gooval	0-8	Cobbly loam------	GC, GM, CL, ML	A-4	5-25	65-95	60-90	50-75	45-60	25-35	5-10
	8-14	Very cobbly clay loam, very gravelly clay loam.	GC	A-6	5-40	50-60	45-55	40-50	35-45	30-40	10-20
	14-23	Very cobbly clay, very gravelly clay.	GC	A-7	5-40	50-60	45-55	40-50	35-45	40-55	20-30
	23-27	Weathered bedrock	---	---	---	---	---	---	---	---	---
176-------------- Gosch	0-4	Very stony sandy loam.	SM	A-2	20-25	85-95	75-85	50-65	25-35	20-30	NP-5
	4-8	Very stony sandy loam.	SM	A-2	20-25	85-95	75-85	50-65	25-35	20-30	NP-5
	8-20	Very cobbly sandy clay loam.	SC	A-6	25-55	85-95	75-85	65-75	35-50	30-40	10-15
	20-42	Extremely cobbly sandy clay loam.	SC	A-6	55-65	85-95	75-85	65-75	35-50	30-40	10-15
	42-46	Weathered bedrock	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
177:											
Gosch-----------	0-3	Gravelly sandy loam.	SM, GM	A-2	0-5	60-80	55-75	45-65	25-35	20-30	NP-5
	3-9	Extremely stony sandy loam.	SM	A-2	10-20	85-95	75-85	50-65	25-35	20-30	NP-5
	9-32	Extremely stony sandy clay loam, extremely stony clay loam.	CL, SC	A-6	25-30	85-95	75-85	65-75	35-60	30-40	10-15
	32-50	Extremely gravelly clay loam.	GP-GC	A-2	0-10	10-35	5-25	5-15	5-10	30-40	10-15
	50-54	Weathered bedrock	---	---	---	---	---	---	---	---	---
Witcher---------	0-4	Sandy loam-------	SM	A-4	0	85-100	75-100	50-70	35-50	20-30	NP-5
	4-36	Sandy clay loam	SC, SC-SM	A-4, A-6	0	85-100	75-100	65-85	35-50	25-40	5-15
	36-47	Very gravelly clay loam, very gravelly sandy clay loam.	GC	A-2	0	35-60	25-50	20-40	15-30	30-40	10-15
	47-57	Weathered bedrock	---	---	---	---	---	---	---	---	---
178, 179, 180---- Goulder	0-7	Gravelly sandy loam.	SM, GM	A-1, A-2	0-15	55-80	50-75	30-50	15-30	20-25	NP-5
	7-17	Cobbly sandy loam	SC-SM, SM	A-2	15-40	85-95	80-90	45-65	25-35	20-30	NP-10
	17-27	Cobbly loam------	CL-ML, ML	A-4	15-40	85-95	80-90	65-85	50-70	20-30	NP-10
	27-41	Very cobbly clay loam, very cobbly sandy clay loam.	SC, CL, GC	A-6, A-2	15-35	60-85	55-80	45-70	25-65	30-40	10-15
	41-58	Very gravelly clay loam, very gravelly sandy clay loam, extremely gravelly clay loam.	SC, GC	A-6, A-2	0-15	30-65	25-60	20-50	10-45	30-40	10-15
	58-64	Very bouldery clay loam.	CL	A-6	10-30	75-90	70-85	65-80	50-70	30-40	10-15
181:											
Gullied land----	0-60	Variable---------	---	---	0	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Mounthat--------	0-10	Gravelly sandy loam.	GM, GP-GM, SP-SM	A-1	0-30	40-60	35-55	20-35	10-15	25-35	NP-5
	10-21	Very cobbly sandy loam.	GM	A-2, A-1	25-60	40-70	35-65	25-40	10-15	25-35	NP-10
	21-27	Very cobbly sandy loam.	SM, SP-SM	A-2, A-1	25-60	60-80	55-75	35-50	10-20	25-35	NP-10
	27-37	Weathered bedrock	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
182:											
Hambone---------	0-8	Gravelly sandy loam.	SM, GM	A-2, A-4	5-10	65-85	60-80	40-65	25-50	20-30	NP-5
	8-22	Very gravelly sandy clay loam.	GC, SC, GP-GC, SP-SC	A-2	5-10	35-70	25-60	20-50	10-30	30-40	10-15
	22-45	Very cobbly sandy clay loam, extremely cobbly sandy clay loam.	GC, SC	A-6, A-2	0-50	35-70	30-65	25-55	20-45	30-40	10-20
	45-49	Weathered bedrock	---	---	---	---	---	---	---	---	---
Boardburn-------	0-9	Sandy loam-------	SM	A-4	0	90-100	85-100	55-70	35-50	20-30	NP-5
	9-22	Loam-------------	CL-ML, CL	A-4	0	90-100	85-100	70-85	50-65	25-35	5-10
	22-40	Sandy clay loam	SC, CL	A-6	0	90-100	85-100	75-90	40-60	30-40	10-15
	40-50	Very gravelly sandy clay loam.	GC	A-2	0-5	35-55	25-50	20-45	15-35	30-40	10-15
	50-54	Weathered bedrock	---	---	---	---	---	---	---	---	---
183:											
Hambone---------	0-8	Gravelly sandy loam.	SM, GM	A-2, A-4	5-10	65-85	60-80	40-65	25-50	20-30	NP-5
	8-22	Very gravelly sandy clay loam.	GC, SC, GP-GC, SP-SC	A-2	5-10	35-70	25-60	20-50	10-30	30-40	10-15
	22-45	Very cobbly sandy clay loam, extremely cobbly sandy clay loam.	GC, SC	A-6, A-2	0-50	35-70	30-65	25-55	20-45	30-40	10-20
	45-49	Weathered bedrock	---	---	---	---	---	---	---	---	---
Boardburn-------	0-9	Sandy loam-------	SM	A-4	0	90-100	85-100	55-70	35-50	20-30	NP-5
	9-22	Loam-------------	CL-ML, CL	A-4	0	90-100	85-100	70-85	50-65	25-35	5-10
	22-40	Sandy clay loam	SC, CL	A-6	0	90-100	85-100	75-90	40-60	30-40	10-15
	40-50	Very gravelly sandy clay loam.	GC	A-2	0-5	35-55	25-50	20-45	15-35	30-40	10-15
	50-54	Weathered bedrock	---	---	---	---	---	---	---	---	---
184------------- Henhill	0-21	Silt loam--------	ML	A-4	0	100	100	95-100	75-85	25-35	NP-10
	21-46	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	75-85	30-45	10-20
	46-62	Sandy loam, silt loam, loam.	CL, CL-ML	A-4, A-6	0	100	100	75-95	50-85	25-35	5-15
185------------- Henhill	0-3	Silt loam--------	ML	A-4	0	100	100	95-100	75-85	25-35	NP-10
	3-36	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	75-85	30-45	10-20
	36-50	Sandy clay loam	SC	A-6	0	100	100	85-95	35-50	30-40	10-20
	50-72	Very gravelly sandy clay loam.	GC	A-2	0	30-55	25-50	25-45	20-35	30-40	10-20
186:											
Hermit----------	0-15	Sandy loam-------	SM	A-4	0	85-100	75-100	50-70	35-50	20-30	NP-5
	15-26	Sandy loam, loam	SM, SC-SM, ML, CL-ML	A-4	0	85-100	75-100	50-80	35-55	25-35	5-10
	26-42	Very gravelly loam.	GM, GM-GC, GC	A-2, A-1	0-5	35-60	25-50	20-40	15-35	25-35	5-10
	42-46	Weathered bedrock	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
186:											
Canyoncreek-----	0-19	Sandy loam-------	SM	A-4	0	85-100	75-100	50-70	35-50	20-30	NP-5
	19-43	Very stony loam, very cobbly loam, extremely cobbly loam.	SC-SM, SM, GM-GC, GM	A-2, A-4	30-55	50-90	40-80	35-65	25-50	25-35	5-10
	43-58	Extremely gravelly loam, very gravelly loam.	GP-GM, GM-GC, GM, GC	A-1, A-2	0-5	20-60	10-50	5-45	5-35	25-35	5-10
	58-68	Weathered bedrock	---	---	---	---	---	---	---	---	---
187:											
Hunsinger-------	0-13	Gravelly sandy loam.	SM, GM	A-2	0-10	55-80	50-75	35-60	25-35	20-30	NP-5
	13-26	Very cobbly sandy clay loam, very gravelly sandy clay loam.	GC	A-2	15-65	35-60	30-55	25-40	15-35	30-40	10-20
	26-42	Cobbly sandy clay loam, very cobbly sandy clay loam.	GC, SC	A-2, A-6	25-45	45-75	40-70	35-60	25-45	30-40	10-20
	42-46	Weathered bedrock	---	---	---	---	---	---	---	---	---
Chirpchatter----	0-7	Sandy loam-------	SM	A-4	0	80-100	75-100	50-70	35-50	20-30	NP-5
	7-32	Sandy clay loam	SC-SM, SC	A-4, A-6	0	80-100	75-95	65-80	35-50	25-35	5-15
	32-70	Gravelly sandy loam.	SM	A-2	5-15	65-80	60-75	40-50	25-30	20-30	NP-5
188:											
Hunsinger-------	0-10	Gravelly sandy loam.	SM, GM	A-2	0-10	55-80	50-75	35-60	25-35	20-30	NP-5
	10-55	Very cobbly sandy clay loam, very gravelly sandy clay loam.	GC	A-2	15-65	35-60	30-55	25-40	15-35	30-40	10-20
	55-59	Weathered bedrock	---	---	---	---	---	---	---	---	---
Chirpchatter----	0-15	Sandy loam-------	SM	A-4	0	80-100	75-100	50-70	35-50	20-30	NP-5
	15-70	Sandy clay loam	SC-SM, SC	A-4, A-6	0	80-100	75-95	65-80	35-50	25-35	5-15
189:											
Hunsinger-------	0-9	Gravelly sandy loam.	SM, GM	A-2	0-10	55-80	50-75	35-60	25-35	20-30	NP-5
	9-40	Cobbly sandy clay loam, very cobbly sandy clay loam.	GC, SC	A-2, A-6	25-45	45-75	40-70	35-60	25-45	30-40	10-20
	40-44	Weathered bedrock	---	---	---	---	---	---	---	---	---
Chirpchatter----	0-15	Sandy loam-------	SM	A-4	0	80-100	75-100	50-70	35-50	20-30	NP-5
	15-70	Sandy clay loam	SC-SM, SC	A-4, A-6	0	80-100	75-95	65-80	35-50	25-35	5-15

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
190-------------- Jacksback	0-12	Loam-------------	SC-SM, CL-ML, SC, CL	A-4	0	90-95	85-90	75-80	45-70	25-30	5-10
	12-21	Loam-------------	SC, CL	A-6	0	90-95	85-90	75-80	45-70	25-30	10-15
	21-42	Sandy clay loam	SC	A-6	0	90-95	85-90	65-80	35-50	30-35	10-15
	42-52	Sandy loam-------	SC-SM, SC	A-2	0	90-95	85-90	55-60	25-35	20-25	5-10
	52-75	Very fine sandy loam, coarse sandy loam, sandy loam.	SC-SM, SC	A-2	0	90-95	85-90	55-60	25-35	20-25	5-10
	75-80	Silt loam--------	CL-ML, CL	A-4	0	90-95	85-90	75-90	65-80	20-25	5-10
191-------------- Jadpor	0-20	Gravelly sandy loam.	SC, SC-SM, GC	A-2, A-1	0-5	55-65	50-60	30-40	15-20	20-25	5-10
	20-32	Extremely cobbly sandy loam.	SC, SC-SM	A-2, A-1	30-70	50-60	45-55	25-35	10-20	20-25	5-10
	32-50	Extremely cobbly sandy clay loam.	GM, GC, GM-GC	A-2, A-1	60-75	50-60	45-55	35-50	15-25	25-35	5-10
	50-64	Extremely cobbly coarse sandy loam.	SM, SC, SC-SM, GM	A-2, A-1	50-70	50-60	45-55	25-35	10-20	25-35	5-10
192-------------- Jadpor	0-5	Very gravelly sandy loam.	SC, CL-ML	A-2, A-1	0-5	30-35	25-50	15-30	10-20	20-25	5-10
	5-12	Extremely cobbly sandy loam.	SC, SC-SM	A-2, A-1	30-70	50-60	45-55	25-35	10-20	20-25	5-10
	12-23	Extremely cobbly sandy clay loam.	GM, GC, GM-GC	A-2, A-1	60-75	50-60	45-55	35-50	15-25	25-35	5-10
	23-61	Extremely cobbly coarse sandy loam.	SM, SC, SC-SM, GM	A-2, A-1	50-70	50-60	45-55	25-35	10-20	25-35	5-10
193:											
Jahjo-----------	0-2	Extremely cobbly fine sandy loam.	SM	A-4	50-85	85-95	75-85	50-65	35-50	---	NP
	2-6	Fine sandy loam	SM	A-4	5-10	85-95	75-85	50-65	35-50	---	NP
	6-12	Loam-------------	SM	A-4	0-5	85-95	75-85	55-75	35-50	20-30	NP-5
	12-16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lava flows------	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Loveness--------	0-7	Sandy loam-------	SM	A-4	0	90-95	85-90	50-65	35-50	20-30	NP-5
	7-12	Loam-------------	CL-ML, ML, CL	A-4	0	90-95	85-90	70-85	50-70	25-35	5-10
	12-19	Gravelly loam, gravelly sandy clay loam.	SC-SM, SM, GM, SC	A-4	10-15	70-80	65-75	55-70	35-50	25-35	5-10
	19-35	Gravelly clay loam, gravelly sandy clay loam.	SC, GC	A-6	10-15	70-80	65-75	60-70	35-50	30-40	10-15
	35-60	Extremely stony clay loam.	CL	A-6	10-15	90-95	85-95	75-85	60-75	30-40	10-15

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
194:											
Jellico---------	0-5	Very stony silt loam.	ML	A-4	20-30	75-95	70-90	65-85	50-70	25-35	NP-10
	5-27	Very stony silt loam, very cobbly silt loam.	CL-ML, CL	A-4, A-6	20-30	65-95	60-90	55-85	50-70	25-35	5-15
	27-33	Extremely stony silt loam, very cobbly silt loam.	CL-ML, CL	A-4, A-6	30-40	70-90	65-85	60-80	50-70	25-35	5-15
	33-37	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lava flows------	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
195:											
Jellico---------	0-6	Very stony silt loam.	ML	A-4	20-30	75-95	70-90	65-85	50-70	25-35	NP-10
	6-23	Very stony silt loam, very cobbly silt loam.	CL-ML, CL	A-4, A-6	20-30	65-95	60-90	55-85	50-70	25-35	5-15
	23-27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Splawn----------	0-3	Very cobbly loam	GM, GM-GC, SM, SC-SM	A-4	40-50	50-80	45-75	40-65	35-50	25-35	5-10
	3-10	Very gravelly loam.	GM, GM-GC, SM	A-2, A-1	15-30	35-65	30-60	25-50	20-35	25-35	5-10
	10-17	Very gravelly clay loam.	GC	A-2, A-6	15-30	35-65	30-60	25-55	20-50	30-40	15-25
	17-24	Extremely gravelly clay loam, extremely gravelly clay.	GC, GP-GC	A-2	15-25	20-35	15-30	15-25	10-25	40-60	20-35
	24-34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
196:											
Jellico---------	0-5	Very stony silt loam.	ML	A-4	20-30	75-95	70-90	65-85	50-70	25-35	NP-10
	5-27	Very stony silt loam, very cobbly silt loam.	CL-ML, CL	A-4, A-6	20-30	65-95	60-90	55-85	50-70	25-35	5-15
	27-33	Extremely stony silt loam, very cobbly silt loam.	CL-ML, CL	A-4, A-6	30-40	70-90	65-85	60-80	50-70	25-35	5-15
	33-37	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
196:											
Splawn----------	0-8	Very cobbly loam	GM, GM-GC, SM, SC-SM	A-4	40-50	50-80	45-75	40-65	35-50	25-35	5-10
	8-15	Very gravelly clay loam.	GC	A-2, A-6	15-30	35-65	30-60	25-55	20-50	30-40	15-25
	15-28	Extremely gravelly clay loam, extremely gravelly clay.	GC, GP-GC	A-2	15-25	20-35	15-30	15-25	10-25	40-60	20-35
	28-32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
197-------------- Jellycamp	0-3	Extremely gravelly sandy loam.	GP-GM, GM	A-1	0-5	15-30	10-25	10-20	5-15	25-35	NP-5
	3-9	Loam-------------	CL-ML, CL	A-4, A-6	0-5	90-100	85-95	75-85	55-70	25-35	5-15
	9-19	Clay-------------	CH, CL	A-7	0-5	95-100	90-100	85-95	80-90	40-60	20-35
	19-30	Indurated--------	---	---	---	---	---	---	---	---	---
	30-34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
198:											
Jellycamp-------	0-7	Very cobbly loam	GM-GC, GM, SC-SM, SM	A-4	30-45	55-75	50-70	45-60	35-50	25-35	5-10
	7-19	Clay-------------	CH, CL	A-7	0-5	95-100	90-100	85-95	80-90	40-60	20-35
	19-30	Indurated--------	---	---	---	---	---	---	---	---	---
	30-34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Karcal----------	0-15	Cobbly silty clay	CH	A-7	15-30	75-95	70-90	65-85	60-80	50-70	25-40
	15-29	Clay, silty clay	CH	A-7	0-20	85-95	80-95	75-90	70-85	50-70	25-40
	29-33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Longcreek-------	0-2	Very cobbly loam	SC-SM, SM, GM-GC, GM	A-4	25-30	65-75	55-65	45-55	35-45	25-35	5-10
	2-8	Very cobbly clay loam.	CL	A-6	30-40	70-80	60-75	55-70	50-60	30-40	15-20
	8-13	Very cobbly clay, very cobbly silty clay.	CL, CH	A-7	30-50	70-80	60-75	55-70	50-65	45-60	25-35
	13-17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
199:											
Jellycamp-------	0-7	Very cobbly loam	GM-GC, GM, SC-SM, SM	A-4	30-45	55-75	50-70	45-60	35-50	25-35	5-10
	7-19	Clay-------------	CH, CL	A-7	0-5	95-100	90-100	85-95	80-90	40-60	20-35
	19-30	Indurated--------	---	---	---	---	---	---	---	---	---
	30-34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Karcal----------	0-15	Cobbly silty clay	CH	A-7	15-30	75-95	70-90	65-85	60-80	50-70	25-40
	15-29	Clay, silty clay	CH	A-7	0-20	85-95	80-95	75-90	70-85	50-70	25-40
	29-33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Longcreek-------	0-3	Very stony loam	SC-SM, SM, GM-GC, GM	A-4	0-5	65-75	55-65	45-55	35-45	25-35	5-10
	3-16	Very cobbly clay loam.	CL	A-6	30-40	70-80	60-75	55-70	50-60	30-40	15-20
	16-20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
200:											
Jellycamp-------	0-3	Very cobbly loam	GM-GC, GM, SC-SM, SM	A-4	30-45	55-75	50-70	45-60	35-50	25-35	5-10
	3-18	Clay-------------	CH, CL	A-7	0-5	95-100	90-100	85-95	80-90	40-60	20-35
	18-38	Indurated--------	---	---	---	---	---	---	---	---	---
	38-42	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lassen----------	0-3	Cobbly clay------	CL, CH	A-7	15-30	80-95	75-90	70-85	60-80	40-60	20-30
	3-28	Clay, clay loam	CL, CH	A-7	0-5	85-95	80-90	75-85	70-85	40-60	15-30
	28-32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Longcreek-------	0-3	Very cobbly loam	SC-SM, SM, GM-GC, GM	A-4	25-30	65-75	55-65	45-55	35-45	25-35	5-10
	3-16	Very cobbly clay loam.	CL	A-6	30-40	70-80	60-75	55-70	50-60	30-40	15-20
	16-20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
201:											
Jellycamp-------	0-3	Very cobbly loam	GM-GC, GM, SC-SM, SM	A-4	30-45	55-75	50-70	45-60	35-50	25-35	5-10
	3-6	Loam-------------	CL, CL-ML	A-4, A-6	0-5	90-100	85-95	65-85	50-65	25-35	5-15
	6-11	Clay-------------	CH, CL	A-7	0-5	95-100	90-100	85-95	80-90	40-60	20-35
	11-16	Indurated--------	---	---	---	---	---	---	---	---	---
	16-20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ollierivas------	0-5	Loam-------------	CL-ML, CL	A-4, A-6	0	90-100	85-100	75-85	50-70	25-35	5-15
	5-23	Clay loam, clay	CL, CH	A-7	0	90-100	85-100	80-95	60-80	40-60	20-35
	23-31	Indurated--------	---	---	---	---	---	---	---	---	---
	31-34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
202:											
Jellycamp-------	0-3	Very cobbly loam	GM-GC, GM, SC-SM, SM	A-4	30-45	55-75	50-70	45-60	35-50	25-35	5-10
	3-6	Loam-------------	CL, CL-ML	A-4, A-6	0-5	90-100	85-95	65-85	50-65	25-35	5-15
	6-11	Clay-------------	CH, CL	A-7	0-5	95-100	90-100	85-95	80-90	40-60	20-35
	11-31	Indurated--------	---	---	---	---	---	---	---	---	---
	31-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Splawn----------	0-8	Very cobbly loam	GM, GM-GC, SM, SC-SM	A-4	40-50	50-80	45-75	40-65	35-50	25-35	5-10
	8-15	Very gravelly clay loam.	GC	A-2, A-6	15-30	35-65	30-60	25-55	20-50	30-40	15-25
	15-28	Extremely gravelly clay loam, extremely gravelly clay.	GC, GP-GC	A-2	15-25	20-35	15-30	15-25	10-25	40-60	20-35
	28-32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ollierivas------	0-5	Loam-------------	CL-ML, CL	A-4, A-6	0	90-100	85-100	75-85	50-70	25-35	5-15
	5-23	Clay loam, clay	CL, CH	A-7	0	90-100	85-100	80-95	60-80	40-60	20-35
	23-31	Indurated--------	---	---	---	---	---	---	---	---	---
	31-34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
203:											
Jellycamp-------	0-5	Loam-------------	ML, CL-ML	A-4	0-5	90-100	85-95	75-85	55-70	25-35	5-10
	5-12	Clay-------------	CH, CL	A-7	0-5	95-100	90-100	85-95	80-90	40-60	20-35
	12-19	Indurated--------	---	---	---	---	---	---	---	---	---
	19-23	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Splawn----------	0-10	Very cobbly loam	GM, GM-GC, SM, SC-SM	A-4	40-50	50-80	45-75	40-65	35-50	25-35	5-10
	10-17	Very gravelly clay loam.	GC	A-2, A-6	15-30	35-65	30-60	25-55	20-50	30-40	15-25
	17-27	Extremely gravelly clay loam, extremely gravelly clay.	GC, GP-GC	A-2	15-25	20-35	15-30	15-25	10-25	40-60	20-35
	27-31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ricketts--------	0-10	Very cobbly loam	SC-SM, SM, GM-GC, GM	A-4	30-45	65-75	60-70	45-60	35-50	25-35	5-10
	10-26	Very cobbly loam, very cobbly clay loam.	SC, GC	A-6	40-60	55-75	50-70	45-60	35-50	30-40	10-15
	26-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
204:											
Jellycamp-------	0-11	Very cobbly loam	GM-GC, GM, SC-SM, SM	A-4	30-45	55-75	50-70	45-60	35-50	25-35	5-10
	11-20	Clay-------------	CH, CL	A-7	0-5	95-100	90-100	85-95	80-90	40-60	20-35
	20-35	Indurated--------	---	---	---	---	---	---	---	---	---
	35-39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Vansickle-------	0-10	Very cobbly loam	CL, CL-ML	A-4, A-6	15-65	70-90	65-85	60-75	50-60	25-35	5-15
	10-16	Very cobbly clay	CL, CH	A-7	30-45	70-100	65-95	60-90	55-85	30-45	10-25
	16-18	Cemented---------	---	---	---	---	---	---	---	---	---
	18-22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
205:											
Jellycamp-------	0-5	Extremely stony loam.	GM-GC, GM, SC-SM, SM	A-4	10-35	55-75	50-70	45-60	35-50	25-35	5-10
	5-12	Clay-------------	CH, CL	A-7	0-5	95-100	90-100	85-95	80-90	40-60	20-35
	12-27	Indurated--------	---	---	---	---	---	---	---	---	---
	27-31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Vansickle-------	0-6	Extremely stony loam.	CL, CL-ML	A-4, A-6	15-65	70-90	65-85	60-75	50-60	25-35	5-15
	6-20	Very cobbly clay	CL	A-6, A-7	30-45	70-100	65-95	60-80	55-75	30-45	10-25
	20-24	Cemented---------	---	---	---	---	---	---	---	---	---
	24-28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
206:											
Jellycamp-------	0-11	Very cobbly loam	GM-GC, GM, SC-SM, SM	A-4	30-45	55-75	50-70	45-60	35-50	25-35	5-10
	11-19	Clay-------------	CH, CL	A-7	0-5	95-100	90-100	85-95	80-90	40-60	20-35
	19-30	Indurated--------	---	---	---	---	---	---	---	---	---
	30-34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
206:											
Vansickle-------	0-6	Extremely stony loam.	CL, CL-ML	A-4, A-6	15-65	70-90	65-85	60-75	50-60	25-35	5-15
	6-20	Very cobbly clay	CL	A-6, A-7	30-45	70-100	65-95	60-80	55-75	30-45	10-25
	20-30	Cemented---------	---	---	---	---	---	---	---	---	---
	30-34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
207, 208:											
Jimmerson loam--	0-5	Loam-------------	ML	A-4	0	80-100	75-100	65-85	50-60	25-35	NP-10
	5-24	Loam, clay loam	CL, CL-ML	A-6, A-4	0	100	95-100	85-90	60-70	25-40	5-15
	24-36	Silty clay loam, clay loam.	CL	A-6	0	100	95-100	85-95	65-85	30-35	10-15
	36-50	Silty clay loam, clay loam, clay.	ML, MH	A-7	0	100	95-100	95-100	80-95	40-55	10-20
	50-62	Cobbly clay loam, cobbly clay.	ML, MH	A-7	5-30	80-90	75-85	70-80	60-75	40-55	10-20
	62-70	Silty clay loam, clay loam, clay.	ML, MH	A-7	0-5	100	95-100	95-100	80-95	40-55	10-20
Jimmerson stony sandy loam-----	0-12	Stony sandy loam	SM	A-4	0	90-95	80-90	55-75	35-50	20-30	NP-5
	12-20	Cobbly loam, cobbly clay loam.	CL, CL-ML	A-4, A-6	0-15	90-95	80-90	70-80	50-65	25-40	5-15
	20-38	Silty clay loam, clay loam.	CL	A-6	0	100	100	85-95	65-85	30-35	10-15
	38-60	Silty clay loam, clay loam, clay.	ML, MH	A-7	0	100	100	95-100	80-95	40-55	10-20
209:											
Jimmerson stony sandy loam-----	0-12	Stony sandy loam	SM	A-4	0	90-95	80-90	55-75	35-50	20-30	NP-5
	12-20	Cobbly loam, cobbly clay loam.	CL, CL-ML	A-4, A-6	0-15	90-95	80-90	70-80	50-65	25-40	5-15
	20-38	Silty clay loam, clay loam.	CL	A-6	0	100	100	85-95	65-85	30-35	10-15
	38-60	Silty clay loam, clay loam, clay.	ML, MH	A-7	0	100	100	95-100	80-95	40-55	10-20
Jimmerson loam--	0-5	Loam-------------	ML	A-4	0	80-100	75-100	65-85	50-60	25-35	NP-10
	5-24	Loam, clay loam	CL, CL-ML	A-6, A-4	0	100	95-100	85-90	60-70	25-40	5-15
	24-36	Silty clay loam, clay loam.	CL	A-6	0	100	95-100	85-95	65-85	30-35	10-15
	36-50	Silty clay loam, clay loam, clay.	ML, MH	A-7	0	100	95-100	95-100	80-95	40-55	10-20
	50-62	Cobbly clay loam, cobbly clay.	ML, MH	A-7	5-30	80-90	75-85	70-80	60-75	40-55	10-20
	62-70	Silty clay loam, clay loam, clay.	ML, MH	A-7	0-5	100	95-100	95-100	80-95	40-55	10-20
210:											
Karcal----------	0-15	Cobbly silty clay	CH	A-7	15-30	75-95	70-90	65-85	60-80	50-70	25-40
	15-29	Clay, silty clay	CH	A-7	0-20	85-95	80-95	75-90	70-85	50-70	25-40
	29-33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
210:											
Cuppy	0-2	Cobbly clay	CL, CH	A-7	20-35	95-100	90-100	85-95	75-90	40-65	20-40
	2-18	Clay	CL, CH	A-7	0-15	95-100	90-100	85-100	75-90	40-65	20-40
	18-29	Clay loam, clay	CL, CH	A-7	0	100	95-100	85-95	70-85	40-60	15-30
	29-31	Indurated	---	---	---	---	---	---	---	---	---
	31-41	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
211 Keddie	0-4	Muck	PT	A-8	0	100	100	95-100	85-100	20-30	NP
	4-42	Loam	CL-ML, CL	A-4, A-6	0	80-100	75-100	65-85	50-65	25-35	5-15
	42-60	Stratified very gravelly loamy coarse sand to very gravelly sandy clay loam.	GM-GC, GM, GP-GM, GP-GC	A-1, A-2	0	30-55	25-50	15-40	5-25	20-30	NP-10
212 Keddie	0-21	Loam	CL-ML, CL	A-4, A-6	0	80-100	75-100	65-85	50-65	25-35	5-15
	21-47	Stratified sandy loam to clay loam.	CL-ML, CL	A-4, A-6	0	80-100	75-100	65-85	50-65	25-35	5-15
	47-60	Stratified gravelly sandy loam to gravelly clay loam.	SC-SM, SC, CL, CL-ML	A-4, A-6	0	65-80	60-75	55-65	35-55	25-35	5-15
213 Keddie	0-9	Silt loam	CL-ML, ML	A-4	0	100	95-100	85-100	70-85	25-35	5-10
	9-60	Clay loam, silty clay loam.	CL	A-6	0	100	95-100	90-100	70-85	30-40	10-20
214:											
Kephart	0-3	Very gravelly loamy coarse sand.	GP, SP, GP-GM, SP-SM	A-1	0	30-55	25-50	15-30	0-5	20-25	NP-5
	3-8	Extremely gravelly coarse sand.	GP	A-1	0	10-30	5-25	0-15	0-5	---	NP
	8-19	Coarse sandy loam	SM, SC-SM	A-2	0	80-95	75-90	45-60	25-35	20-25	NP-5
	19-25	Sandy loam	SC-SM, SC	A-2	0	80-95	75-90	45-60	25-35	20-25	5-10
	25-68	Sandy clay loam	SC-SM, SC	A-2, A-4	0	80-95	75-90	65-80	30-50	25-30	5-10
Quaking	0-3	Very gravelly loamy coarse sand.	GP-GM, GW-GM, GM, GM-GC	A-1	0	30-55	25-50	15-30	5-15	20-25	NP-5
	3-7	Extremely gravelly sand.	GP, GP-GM	A-1	0	10-30	5-25	0-15	0-5	0-14	NP
	7-14	Gravelly coarse sandy loam.	GM-GC, GM, SC, SM	A-1, A-2	0	55-80	50-75	30-50	15-30	20-25	NP-5
	14-21	Very gravelly sandy loam.	GM-GC, GP-GC, GC	A-1, A-2	0	30-55	25-50	15-30	10-20	20-25	5-10
	21-32	Extremely gravelly sandy clay loam.	GP, GM-GC, GC, GP-GC	A-1, A-2	0	15-30	10-25	5-20	0-15	25-30	5-10
	32-64	Extremely gravelly coarse sandy loam.	GP, GP-GC	A-1, A-2	10-30	10-30	5-25	0-20	0-10	20-25	5-10
215 Kettlebelly	0-10	Gravelly loam	SM, GM	A-4	0-5	65-80	60-75	55-70	35-50	30-35	5-10
	10-67	Silty clay loam, silty clay.	ML, MH	A-7	0	80-100	75-100	70-100	65-95	40-60	10-25
	67-99	Silt loam, silty clay loam.	ML	A-6, A-7	0	80-100	75-100	70-95	65-90	35-50	10-20
	99	Weathered bedrock	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
216:											
Kettlebelly-----	0-4	Gravelly loam----	CL-ML, GM-GC, SC-SM	A-4, A-2	0	60-85	50-75	40-65	30-55	25-30	5-10
	4-22	Gravelly loam----	CL-ML, CL	A-4	0	70-85	65-75	60-65	55-60	25-30	5-10
	22-30	Gravelly clay loam.	GC, SC, CL	A-6	0	60-85	50-75	45-65	35-55	30-35	10-15
	30-99	Silty clay loam, clay loam.	CL	A-6	0	100	100	95-100	70-80	30-35	10-15
Neuns-----------	0-3	Gravelly sandy loam.	SM, GM, GM-GC, SC-SM	A-2	0-5	55-80	50-75	30-50	25-35	15-25	NP-5
	3-32	Very gravelly sandy loam, very gravelly loam.	GM, GP-GM, GM-GC	A-1, A-2	0-10	30-55	25-50	20-45	10-35	15-25	NP-5
	32-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
217:											
Kettlebelly-----	0-4	Gravelly loam----	CL-ML, GM-GC, SC-SM	A-4, A-2	0	60-85	50-75	40-65	30-55	25-30	5-10
	4-22	Gravelly loam----	CL-ML, CL	A-4	0	70-85	65-75	60-65	55-60	25-30	5-10
	22-30	Gravelly clay loam.	GC, SC, CL	A-6	0	60-85	50-75	45-65	35-55	30-35	10-15
	30-99	Silty clay loam, clay loam.	CL	A-6	0	100	100	95-100	70-95	30-35	10-15
Neuns-----------	0-3	Gravelly sandy loam.	SM, GM, GM-GC, SC-SM	A-2	0-5	55-80	50-75	30-50	25-35	15-25	NP-5
	3-32	Very gravelly sandy loam, very gravelly loam.	GM, GP-GM, GM-GC	A-1, A-2	0-10	30-55	25-50	20-45	10-35	15-25	NP-5
	32-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
218, 219:											
Kettlebelly-----	0-10	Gravelly loam----	SM, GM	A-4	0-5	65-80	60-75	55-70	35-50	30-35	5-10
	10-67	Silty clay loam, silty clay.	ML, MH	A-7	0	80-100	75-100	70-100	65-95	40-60	10-25
	67-99	Silt loam, silty clay loam.	ML	A-6, A-7	0	80-100	75-100	70-95	65-90	35-50	10-20
	99	Weathered bedrock	---	---	---	---	---	---	---	---	---
Neuns-----------	0-7	Gravelly sandy loam.	SM, GM, GM-GC, SC-SM	A-2	0-5	55-80	50-75	30-50	25-35	15-25	NP-5
	7-32	Very gravelly sandy loam, very gravelly loam.	GM, GP-GM, GM-GC	A-1, A-2	0-10	30-55	25-50	20-45	10-35	15-25	NP-5
	32-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
220, 221, 222---- Kilarc	0-7	Gravelly silt loam.	SC, SC-SM, GC, GM-GC	A-4	0-5	60-85	50-75	50-70	40-50	20-30	5-10
	7-24	Clay-------------	CL, CH	A-7	0	95-100	85-95	80-90	75-85	45-60	25-45
	24-50	Gravelly sandy clay.	SM, SC	A-2	0	70-80	60-75	50-70	25-35	40-55	15-25
	50-54	Weathered bedrock	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
223, 224:											
Kindig----------	0-2	Gravelly sandy loam.	SM, GM	A-2, A-4	0-5	55-80	50-75	35-50	30-50	15-25	NP-5
	2-8	Gravelly loam, gravelly sandy loam.	SM, GM	A-2, A-4	0-10	55-80	50-75	35-60	30-50	15-25	NP-5
	8-14	Very gravelly loam, very gravelly sandy loam.	GM	A-1, A-2	0-10	30-60	25-50	15-50	10-35	15-25	NP-5
	14-49	Very cobbly loam, very cobbly sandy loam.	GM, SM	A-1, A-2	20-50	50-75	45-70	30-55	20-35	15-25	NP-5
	49-53	Weathered bedrock	---	---	---	---	---	---	---	---	---
Neuns-----------	0-3	Gravelly sandy loam.	SM, GM, GM-GC, SC-SM	A-2	0-5	55-80	50-75	30-50	25-35	15-25	NP-5
	3-32	Very gravelly sandy loam, very gravelly loam.	GM, GP-GM, GM-GC	A-1, A-2	0-10	30-55	25-50	20-45	10-35	15-25	NP-5
	32-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
225:											
Lassen----------	0-2	Cobbly clay------	CL, CH	A-7	15-30	80-95	75-90	70-85	60-80	40-60	20-30
	2-28	Clay, clay loam	CL, CH	A-7	0-5	85-95	80-90	75-85	70-85	40-60	15-30
	28-32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Cuppy-----------	0-2	Cobbly clay------	CL, CH	A-7	20-35	95-100	90-100	85-95	75-90	40-65	20-40
	2-18	Clay-------------	CL, CH	A-7	0-15	95-100	90-100	85-100	75-90	40-65	20-40
	18-29	Clay loam, clay	CL, CH	A-7	0	100	95-100	85-95	70-85	40-60	15-30
	29-31	Indurated--------	---	---	---	---	---	---	---	---	---
	31-41	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
226------------- Lasvar	0-2	Clay-------------	CL, CH	A-7	0	100	100	90-100	75-95	45-55	25-35
	2-30	Clay-------------	CL, CH	A-7	0	100	100	90-100	75-95	45-55	25-35
	30-38	Silt loam, silty clay loam.	CL	A-6	0	100	100	90-100	70-95	30-35	10-15
	38-42	Indurated--------	---	---	---	---	---	---	---	---	---
227:											
Lasvar----------	0-3	Clay-------------	CL, CH	A-7	0	100	100	90-100	75-95	45-55	25-35
	3-28	Clay-------------	CL, CH	A-7	0	100	100	90-100	75-95	45-55	25-35
	28-31	Silt loam, silty clay loam.	CL	A-6	0	100	100	90-100	70-95	30-35	10-15
	31-60	Indurated--------	---	---	---	---	---	---	---	---	---
Pitvar----------	0-36	Clay-------------	CL, ML	A-7	0	100	100	90-100	85-95	40-50	15-30
	36-55	Clay, silty clay	CL, CH, ML, MH	A-7	0	100	100	90-100	85-95	40-60	15-45
	55-58	Indurated--------	---	---	---	---	---	---	---	---	---
	58-72	Clay loam--------	CL	A-6	0	100	100	90-100	85-95	35-40	15-20
228------------- Lava flows	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
229:											
Lava flows------	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
229:											
Gassaway--------	0-3	Cobbly loam------	CL-ML, ML	A-4	5-40	75-95	70-90	60-80	50-60	25-35	5-10
	3-12	Loam, gravelly loam.	GM-GC, GM, CL-ML, ML	A-4	0-5	60-90	55-85	45-65	35-55	25-35	5-10
	12-22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
230:											
Lava flows------	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Neer------------	0-6	Very cobbly loam	SM	A-1, A-2	30-40	55-75	50-70	35-55	20-35	25-35	NP-5
	6-32	Very gravelly loam.	GM, SM	A-1	5-20	30-70	25-50	20-40	10-25	25-35	NP-5
	32-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
231-------------- Longbell	0-3	Gravelly coarse sandy loam.	SM, GM	A-2	0	65-85	55-75	45-65	25-35	20-30	NP-5
	3-30	Gravelly loamy coarse sand.	SM, SP-SM	A-1, A-2	0	65-85	55-75	30-55	10-25	20-30	NP-5
	30-42	Gravelly loamy sand.	SP-SM	A-1	0	65-85	55-75	30-40	5-10	0-14	NP
	42-72	Very gravelly sand.	GP-GM, SP-SM	A-1	0	35-60	25-50	20-30	5-10	10-15	NP-5
232:											
Longbell--------	0-3	Gravelly coarse sandy loam.	SM, GM	A-2	0	65-85	55-75	45-65	25-35	20-30	NP-5
	3-30	Gravelly loamy coarse sand.	SM, SP-SM	A-1, A-2	0	65-85	55-75	30-55	10-25	20-30	NP-5
	30-42	Gravelly loamy sand.	SP-SM	A-1	0	65-85	55-75	30-40	5-10	0-14	NP
	42-72	Very gravelly sand.	GP-GM, SP-SM	A-1	0	35-60	25-50	20-30	5-10	10-15	NP-5
Lava flows------	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
233:											
Longbilly-------	0-4	Silt loam--------	CL-ML, ML, CL	A-4	0	100	100	85-95	65-85	25-35	5-10
	4-54	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	90-100	85-95	40-60	20-35
	54-60	Sandy clay loam, clay loam.	SC, CL	A-6	0	100	100	85-95	40-75	30-40	10-20
Modoc-----------	0-3	Sandy loam-------	SM	A-4	0	80-100	75-100	55-80	35-50	20-30	NP-5
	3-32	Sandy clay loam, clay loam.	SC, CL	A-6	0	80-100	75-100	60-90	35-65	30-40	10-20
	32-60	Indurated--------	---	---	---	---	---	---	---	---	---
234:											
Longbilly-------	0-4	Silt loam--------	CL-ML, ML, CL	A-4	0	100	100	85-95	65-85	25-35	5-10
	4-54	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	90-100	85-95	40-60	20-35
	54-60	Sandy clay loam, clay loam.	SC, CL	A-6	0	100	100	85-95	40-75	30-40	10-20

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
234:											
Pit	0-4	Silty clay	MH, CH	A-7	0	100	100	95-100	85-95	50-65	20-35
	4-40	Silty clay loam, silty clay, clay.	CL, CH	A-7	0	100	100	95-100	85-95	40-65	15-35
	40-45	Silty clay loam, clay loam.	ML, CL	A-6, A-7	0	100	100	90-100	75-90	30-50	10-20
	45-60	Silt loam	ML	A-4	0	100	100	90-100	70-85	30-40	5-10
235:											
Longcreek	0-3	Very cobbly loam	SC-SM, SM, GM-GC, GM	A-4	25-30	65-75	55-65	45-55	35-45	25-35	5-10
	3-16	Very cobbly clay loam.	CL	A-6	30-40	70-80	60-75	55-70	50-60	30-40	15-20
	16-20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Vansickle	0-1	Very cobbly loam	CL, CL-ML	A-4, A-6	15-65	70-90	65-85	60-75	50-60	25-35	5-15
	1-6	Very cobbly clay loam.	CL, CL-ML	A-4, A-6	15-65	70-90	65-85	60-75	50-60	25-35	5-15
	6-13	Very cobbly clay	CL	A-6, A-7	30-45	70-100	65-95	60-80	55-75	30-45	10-25
	13-14	Cemented	---	---	---	---	---	---	---	---	---
	14-24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
236:											
Lonkey	0-8	Loam	CL-ML, CL	A-4	0	90-100	85-100	70-95	55-75	25-30	5-10
	8-13	Clay loam	CL	A-6	0	90-100	85-100	75-90	60-80	30-35	10-15
	13-38	Clay loam	CL	A-6	0	90-100	85-100	75-90	60-80	30-35	10-15
	38-48	Weathered bedrock	---	---	---	---	---	---	---	---	---
Datom	0-3	Clay loam	MH	A-7	0-5	100	95-100	90-100	80-85	50-60	10-15
	3-12	Silty clay	MH	A-7	0-5	100	95-100	90-100	85-90	50-60	15-20
	12-16	Silty clay	MH	A-7	0-5	100	80-95	75-95	65-90	60-70	20-25
	16-20	Weathered bedrock	---	---	---	---	---	---	---	---	---
237, 238:											
Lonkey	0-4	Cobbly sandy loam	SM	A-4	20-35	75-95	70-90	50-70	35-50	20-30	NP-5
	4-14	Loam, clay loam	CL-ML, CL	A-4, A-6	0-5	80-95	75-90	70-80	50-75	25-40	5-15
	14-19	Gravelly sandy clay loam, gravelly clay loam.	GC, SC	A-6, A-2	0-10	55-80	50-75	40-70	25-50	30-40	10-20
	19-24	Gravelly clay	CL, CH, GC	A-7	0-5	55-80	50-75	45-70	40-60	40-60	15-30
	24-34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Malinda	0-2	Very gravelly sandy loam.	GM	A-1	10-15	35-50	30-45	20-35	15-20	0-14	NP
	2-11	Gravelly loam, loam.	GM-GC, GM, CL-ML, ML	A-4	0-10	65-95	60-90	55-75	40-60	25-35	5-10
	11-16	Clay loam, gravelly clay loam.	CL	A-6	0	65-95	60-90	55-85	50-70	30-40	10-15
	16-26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
239:											
Lonkey----------	0-16	Gravelly sandy loam.	SM, GM	A-2	0-10	60-80	55-75	40-55	25-35	20-30	NP-5
	16-25	Gravelly sandy clay loam, gravelly clay loam.	GC, SC	A-6, A-2	0-10	55-80	50-75	40-70	25-50	30-40	10-20
	25-28	Gravelly clay----	CL, CH, GC	A-7	0-5	55-80	50-75	45-70	40-60	40-60	15-30
	28-32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Malinda---------	0-2	Very gravelly sandy loam.	GM	A-1	10-15	35-50	30-45	20-35	15-20	0-14	NP
	2-6	Gravelly loam, loam.	GM-GC, GM, CL-ML, ML	A-4	0-10	65-95	60-90	55-75	40-60	25-35	5-10
	6-17	Clay loam, gravelly clay loam.	CL	A-6	0	65-95	60-90	55-85	50-70	30-40	10-15
	17-21	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
240, 241:											
Loveness--------	0-7	Sandy loam-------	SM	A-4	0	90-95	85-90	50-65	35-50	20-30	NP-5
	7-12	Loam-------------	CL-ML, ML, CL	A-4	0	90-95	85-90	70-85	50-70	25-35	5-10
	12-19	Gravelly loam, gravelly sandy clay loam.	SC-SM, SM, GM, SC	A-4	10-15	70-80	65-75	55-70	35-50	25-35	5-10
	19-35	Gravelly clay loam, gravelly sandy clay loam.	SC, GC	A-6	10-15	70-80	65-75	60-70	35-50	30-40	10-15
	35-60	Extremely stony clay loam.	CL	A-6	10-15	90-95	85-95	75-85	60-75	30-40	10-15
Fleener---------	0-4	Sandy loam-------	SM	A-4	0	80-95	75-90	50-65	35-50	20-30	NP-5
	4-10	Gravelly sandy loam.	SM, GM	A-2	0-5	55-80	50-75	40-50	25-35	20-30	NP-5
	10-28	Very gravelly sandy loam, very gravelly sandy clay loam.	GM-GC, GM, GC, SM	A-2, A-1	10-15	35-65	30-60	25-50	20-35	25-35	5-10
	28-60	Extremely stony sandy clay loam, extremely stony clay loam.	GC	A-2	10-15	35-45	30-40	25-35	20-30	30-40	10-15
242------------- Lunsford	0-13	Loam-------------	ML	A-4	0	100	100	85-95	50-65	25-35	NP-5
	13-29	Sandy clay loam	SC-SM, SM, SC	A-4	0	100	100	80-95	35-50	25-35	5-10
	29-60	Stratified sandy clay loam to silty clay loam.	SC, SC-SM	A-4, A-6	0	100	100	80-95	35-50	25-35	5-15
243, 244, 245---- Malinda	0-3	Extremely gravelly sandy loam.	GP-GM, GM	A-1	10-15	15-30	10-25	10-20	5-15	0-14	NP
	3-8	Gravelly loam, loam.	GM-GC, GM, CL-ML, ML	A-4	0-10	65-95	60-90	55-75	40-60	25-35	5-10
	8-14	Clay loam, gravelly clay loam.	CL	A-6	0	65-95	60-90	55-85	50-70	30-40	10-15
	14-18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
246-------------- Malinda	0-3	Very cobbly loam	SM, SC-SM	A-2	40-60	65-90	55-80	40-65	25-35	20-25	NP-5
	3-8	Loam-------------	CL-ML, CL	A-4	0	95-100	85-90	75-85	60-70	25-30	5-10
	8-13	Gravelly clay loam.	CL, SC	A-6	0	70-85	60-75	55-65	40-60	30-35	10-15
	13-17	Clay loam--------	CL	A-6	0	95-100	85-90	75-85	60-70	30-35	10-15
	17-21	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
247-------------- Matquaw	0-4	Gravelly sandy loam.	SM	A-2	0	75-80	60-75	45-60	25-35	20-30	NP-5
	4-10	Sandy loam-------	SM	A-4	0	80-95	75-95	55-65	35-50	20-30	NP-5
	10-27	Very fine sandy loam.	ML, CL, CL-ML	A-4	0	95-100	90-100	85-95	50-60	15-30	NP-10
	27-34	Loamy sand-------	SM	A-2	0	95-100	90-100	50-60	15-25	---	NP
	34-72	Stratified extremely gravelly loamy sand to very gravelly sandy loam.	GP-GM	A-1	0-5	20-50	15-45	10-15	5-10	---	NP
248-------------- Matquaw	0-4	Very gravelly sandy loam.	GM	A-1	0	35-50	30-45	20-35	15-20	20-30	NP-5
	4-10	Sandy loam-------	SM	A-4	0	80-95	75-95	55-65	35-50	20-30	NP-5
	10-27	Very fine sandy loam.	ML, CL, CL-ML	A-4	0	95-100	90-100	85-95	50-60	15-30	NP-10
	27-34	Loamy sand-------	SM	A-2	0	95-100	90-100	50-60	15-25	---	NP
	34-72	Stratified extremely gravelly loamy sand to very gravelly sandy loam.	GP-GM	A-1	0-5	20-50	15-45	10-15	5-10	---	NP
249:											
Medici----------	0-1	Coarse sandy loam	SM	A-2	0	95-100	85-90	50-65	25-35	0-14	NP
	1-19	Gravelly coarse sandy loam.	SM, GM	A-2, A-1	0	60-85	50-75	30-45	20-30	0-14	NP
	19-51	Very gravelly coarse sandy loam.	GM, SM, GP-GM, SP-SM	A-1	0	35-60	25-50	15-35	10-20	0-14	NP
	51-67	Very gravelly loam.	GM	A-1, A-2	0	35-60	25-50	20-45	15-30	0-14	NP
	67-75	Stratified coarse sand to loamy coarse sand.	SP-SM	A-1	0	85-100	75-95	35-45	5-10	0-14	NP
Blankout--------	0-9	Coarse sandy loam	SM	A-2	0	90-100	80-95	50-60	25-35	---	NP
	9-18	Coarse sandy loam	SM	A-2, A-4	0	90-100	80-95	55-75	25-40	20-30	NP-5
	18-62	Gravelly coarse sandy loam.	SM	A-1, A-2	0-10	65-85	50-75	40-50	20-30	20-30	NP-5
	62-81	Extremely gravelly coarse sandy loam.	GM, GP-GM	A-1	15-30	35-45	25-35	15-25	10-20	20-30	NP-5

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
250, 251--------- Medlake	0-2	Gravelly coarse sandy loam.	SM, GM, GM-GC, SC-SM	A-1, A-2	0	55-80	50-75	30-50	15-30	20-25	NP-5
	2-6	Very gravelly loamy coarse sand.	GP-GM, GM	A-1	0	30-50	25-45	15-35	5-15	20-25	NP-5
	6-32	Extremely gravelly coarse sand.	GP, GP-GM	A-1	0	10-30	5-25	0-15	0-5	20-25	NP-5
	32-69	Gravelly coarse sandy loam.	SM, GM, GM-GC, SC-SM	A-1, A-2	0	55-80	50-75	30-50	15-30	20-25	NP-5
	69-75	Sandy loam-------	SC, SC-SM	A-2	0	80-100	75-90	40-65	25-35	20-25	5-10
252-------------- Modoc	0-3	Loam-------------	ML, CL-ML	A-4	0	80-100	75-100	60-85	50-60	25-35	5-10
	3-32	Sandy clay loam, clay loam.	SC, CL	A-6	0	80-100	75-100	60-90	35-65	30-40	10-20
	32-60	Indurated--------	---	---	---	---	---	---	---	---	---
253-------------- Modoc	0-3	Sandy loam-------	SM	A-4	0	80-100	75-100	55-80	35-50	20-30	NP-5
	3-32	Sandy clay loam, clay loam.	SC, CL	A-6	0	80-100	75-100	60-90	35-65	30-40	10-20
	32-60	Indurated--------	---	---	---	---	---	---	---	---	---
254:											
Mounthat--------	0-10	Gravelly sandy loam.	GM, GP-GM, SP-SM	A-1	0-30	40-60	35-55	20-35	10-15	25-35	NP-5
	10-21	Very cobbly sandy loam.	GM	A-2, A-1	25-60	40-70	35-65	25-40	10-15	25-35	NP-10
	21-27	Very cobbly sandy loam.	SM, SP-SM	A-2, A-1	25-60	60-80	55-75	35-50	10-20	25-35	NP-10
	27-37	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
255-------------- Murken	0-7	Very stony loam	CL-ML, ML, CL	A-4	15-30	75-85	70-80	60-65	50-60	25-35	5-10
	7-23	Bouldery loam----	CL-ML, CL	A-4, A-6	5-10	85-90	80-85	65-75	50-60	25-35	5-15
	23-33	Very bouldery loam.	GM-GC, GC, SC-SM, SC	A-4, A-6	10-25	65-80	60-75	55-65	40-50	25-35	5-15
	33-43	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
256-------------- Nanny	0-8	Gravelly sandy loam.	SM, GM	A-2	0-5	55-80	50-75	40-60	25-35	20-30	NP-5
	8-60	Very gravelly loam, very gravelly sandy loam.	GM, GM-GC	A-1, A-2	5-15	30-55	25-50	20-45	15-35	20-30	NP-10
257-------------- Neer	0-16	Gravelly sandy loam.	SM, GM	A-1, A-2	0-15	60-90	50-75	30-50	20-35	25-35	NP-5
	16-36	Very gravelly sandy loam.	GP-GM, SP-SM	A-1	0-20	30-70	25-50	20-40	10-25	25-35	NP-5
	36-40	Weathered bedrock	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
258:											
Neer	0-10	Gravelly sandy loam.	SM, GM	A-1, A-2	0-15	60-90	50-75	30-50	20-35	25-35	NP-5
	10-24	Very gravelly sandy loam.	GP-GM, SP-SM	A-1	0-20	30-70	25-50	20-40	10-25	25-35	NP-5
	24-39	Very gravelly sandy loam.	GP-GM, SP-SM	A-1	0-20	30-70	25-50	20-40	10-25	25-35	NP-5
	39-43	Weathered bedrock	---	---	---	---	---	---	---	---	---
Ponto	0-6	Sandy loam	SM	A-4	0-5	80-100	75-100	50-75	35-50	20-30	NP-5
	6-62	Sandy loam, loam	SM, ML	A-4	0-10	80-100	75-95	50-80	35-60	20-30	NP-5
259, 260:											
Neer	0-16	Gravelly sandy loam.	SM, GM	A-1, A-2	0-15	60-90	50-75	30-50	20-35	25-35	NP-5
	16-36	Very gravelly sandy loam.	GP-GM, SP-SM	A-1	0-20	30-70	25-50	20-40	10-25	25-35	NP-5
	36-40	Weathered bedrock	---	---	---	---	---	---	---	---	---
Ponto	0-8	Sandy loam	SM	A-4	0-5	80-100	75-100	50-75	35-50	20-30	NP-5
	8-68	Sandy loam, loam	SM, ML	A-4	0-10	80-100	75-95	50-80	35-60	20-30	NP-5
261:											
Neuns	0-7	Gravelly sandy loam.	SM, GM, GM-GC, SC-SM	A-2	0-5	55-80	50-75	30-50	25-35	15-25	NP-5
	7-32	Very gravelly sandy loam, very gravelly loam.	GM, GP-GM, GM-GC	A-1, A-2	0-10	30-55	25-50	20-45	10-35	15-25	NP-5
	32-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Kettlebelly	0-10	Gravelly loam	SM, GM	A-4	0-5	65-80	60-75	55-70	35-50	30-35	5-10
	10-67	Silty clay loam, silty clay.	ML, MH	A-7	0	80-100	75-100	70-100	65-95	40-60	10-25
	67-99	Silt loam, silty clay loam.	ML	A-6, A-7	0	80-100	75-100	70-95	65-90	35-50	10-20
	99-99	Weathered bedrock	---	---	---	---	---	---	---	---	---
262:											
Neuns	0-3	Gravelly sandy loam.	SM, GM, GM-GC, SC-SM	A-2	0-5	55-80	50-75	30-50	25-35	15-25	NP-5
	3-32	Very gravelly sandy loam, very gravelly loam.	GM, GP-GM, GM-GC	A-1, A-2	0-10	30-55	25-50	20-45	10-35	15-25	NP-5
	32-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Kettlebelly	0-4	Gravelly loam	CL-ML, GM-GC, SC-SM	A-4, A-2	0	60-85	50-75	40-65	30-55	25-30	5-10
	4-22	Gravelly loam	CL-ML, CL	A-4	0	70-85	65-75	60-65	55-60	25-30	5-10
	22-30	Gravelly clay loam.	GC, SC, CL	A-6	0	60-85	50-75	45-65	35-55	30-35	10-15
	30-99	Silty clay loam, clay loam.	CL	A-6	0	100	100	95-100	70-80	30-35	10-15

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
263:											
Neuns-----------	0-3	Gravelly sandy loam.	SM, GM, GM-GC, SC-SM	A-2	0-5	55-80	50-75	30-50	25-35	15-25	NP-5
	3-32	Very gravelly sandy loam, very gravelly loam.	GM, GP-GM, GM-GC	A-1, A-2	0-10	30-55	25-50	20-45	10-35	15-25	NP-5
	32-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Kindig----------	0-2	Gravelly sandy loam.	SM, GM	A-2, A-4	0-5	55-80	50-75	35-50	30-50	15-25	NP-5
	2-8	Gravelly loam, gravelly sandy loam.	SM, GM	A-2, A-4	0-10	55-80	50-75	35-60	30-50	15-25	NP-5
	8-14	Very gravelly loam, very gravelly sandy loam.	GM	A-1, A-2	0-10	30-60	25-50	15-50	10-35	15-25	NP-5
	14-49	Very cobbly loam, very cobbly sandy loam.	GM, SM	A-1, A-2	20-50	50-75	45-70	30-55	20-35	15-25	NP-5
	49-53	Weathered bedrock	---	---	---	---	---	---	---	---	---
264:											
Nikal-----------	0-18	Sandy loam-------	SM	A-4	0-5	80-95	75-95	50-70	35-50	0-14	NP
	18-28	Gravelly sandy loam.	SM, GM	A-2	5-15	65-80	60-75	45-65	25-35	0-14	NP
	28-36	Very gravelly sandy loam, gravelly sandy loam.	GM, SM	A-1, A-2	5-20	45-75	35-70	30-55	20-35	0-14	NP
	36-46	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Chatterdown-----	0-15	Fine sandy loam	SM	A-4	0-5	85-100	75-95	50-70	35-45	---	NP
	15-30	Sandy loam, fine sandy loam, gravelly fine sandy loam.	SM, GM	A-2, A-4	0-10	60-90	50-80	40-70	25-40	---	NP
	30-47	Sandy loam, fine sandy loam, gravelly sandy loam.	SM, GM	A-2, A-4	0-10	60-90	50-80	40-70	25-40	---	NP
	47-63	Sandy loam, gravelly sandy loam.	SM, GM	A-2, A-4	5-20	65-90	60-85	40-70	25-40	---	NP
	63-67	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lava flows------	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
265-------------- Nosoni	0-2	Loam------------	CL-ML, CL	A-4	0	100	100	85-90	60-75	25-30	5-10
	2-8	Sandy clay loam	SC-SM, SC	A-4	0	100	100	80-90	35-50	25-30	5-10
	8-80	Clay loam, sandy clay loam.	SC, CL	A-6	0	100	100	80-95	35-80	30-40	10-15

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
266, 267:											
Obie	0-7	Very gravelly sandy loam.	GM, SM	A-2, A-1	0-15	55-80	50-75	35-55	20-35	---	NP
	7-20	Very gravelly sandy loam.	GM, SM	A-2, A-1	5-15	55-75	50-70	35-50	20-30	---	NP
	20-35	Very gravelly sandy loam.	GM, SM	A-1, A-2	5-15	40-65	35-60	25-40	15-30	---	NP
	35-46	Very gravelly sandy loam.	GM, GP-GM	A-1	10-20	35-50	30-45	20-25	10-15	---	NP
	46-56	Weathered bedrock	---	---	---	---	---	---	---	---	---
Mounthat	0-10	Gravelly sandy loam.	GM, GP-GM, SP-SM	A-1	0-30	40-60	35-55	20-35	10-15	25-35	NP-5
	10-21	Very cobbly sandy loam.	GM	A-2, A-1	25-60	40-70	35-65	25-40	10-15	25-35	NP-10
	21-27	Very cobbly sandy loam.	SM, SP-SM	A-2, A-1	25-60	60-80	55-75	35-50	10-20	25-35	NP-10
	27-37	Weathered bedrock	---	---	---	---	---	---	---	---	---
268:											
Obie	0-20	Very gravelly sandy loam.	GM, SM	A-2, A-1	0-15	55-80	50-75	35-55	20-35	---	NP
	20-46	Very gravelly sandy loam.	GM, SM	A-1, A-2	5-15	40-65	35-60	25-40	15-30	---	NP
	46-50	Weathered bedrock	---	---	---	---	---	---	---	---	---
Mounthat	0-10	Gravelly sandy loam.	GM, GP-GM, SP-SM	A-1	0-30	40-60	35-55	20-35	10-15	25-35	NP-5
	10-21	Very cobbly sandy loam.	GM	A-2, A-1	25-60	40-70	35-65	25-40	10-15	25-35	NP-10
	21-27	Very cobbly sandy loam.	SM, SP-SM	A-2, A-1	25-60	60-80	55-75	35-50	10-20	25-35	NP-10
	27-37	Weathered bedrock	---	---	---	---	---	---	---	---	---
269 Odas	0-8	Loam	ML, CL-ML	A-4	0-5	80-100	75-95	60-80	50-60	15-25	NP-5
	8-31	Sandy loam	SM, SC-SM	A-2, A-4	0-5	80-100	75-95	50-70	25-50	15-25	NP-5
	31-60	Sandy loam, loam	SM, SC-SM	A-2, A-4	0-5	80-100	75-95	50-80	25-50	15-25	NP-5
270:											
Oxendine	0-3	Cobbly sandy clay loam.	SC	A-6	15-40	85-95	80-90	70-80	35-45	30-35	10-15
	3-5	Sandy clay loam	SC, CL	A-6, A-2	0	95-100	90-100	70-90	30-55	30-40	10-20
	5-7	Clay loam	CL	A-6	0	95-100	90-100	80-90	65-80	30-40	10-20
	7-9	Clay	CL	A-7	0	95-100	90-100	85-95	70-80	40-50	25-35
	9-12	Indurated	---	---	---	---	---	---	---	---	---
	12-22	Weathered bedrock	---	---	---	---	---	---	---	---	---
Lonkey	0-8	Loam	CL-ML, CL	A-4	0	90-100	85-100	70-95	55-75	25-30	5-10
	8-13	Clay loam	CL	A-6	0	90-100	85-100	75-90	60-80	30-35	10-15
	13-38	Clay loam	CL	A-6	0	90-100	85-100	75-90	60-80	30-35	10-15
	38-48	Weathered bedrock	---	---	---	---	---	---	---	---	---
271:											
Oxendine	0-2	Extremely gravelly sandy loam.	GP-GM, GM	A-1	10-25	25-35	20-30	15-25	5-15	20-30	NP-5
	2-10	Sandy clay loam, clay loam.	SC, CL	A-6	0-5	80-95	75-90	70-80	35-60	30-40	10-15
	10-20	Indurated	---	---	---	---	---	---	---	---	---
	20-30	Weathered bedrock	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
271:											
Sweagert--------	0-7	Loam-------------	CL-ML, ML, CL	A-4	0	90-100	80-100	70-95	50-65	25-35	5-10
	7-25	Clay loam, loam	CL	A-6	0	90-100	80-100	70-95	55-75	30-40	10-15
	25-35	Clay loam, clay	CL	A-6, A-7	0	90-100	80-95	75-95	60-85	35-50	15-25
	35-60	Indurated--------	---	---	---	---	---	---	---	---	---
272:											
Oxendine--------	0-3	Very gravelly sandy loam.	GM	A-1, A-2	10-25	35-60	30-55	25-45	20-30	20-30	NP-5
	3-13	Sandy clay loam, clay loam.	SC, CL	A-6	0-5	80-95	75-90	70-80	35-60	30-40	10-15
	13-20	Indurated--------	---	---	---	---	---	---	---	---	---
	20-24	Weathered bedrock	---	---	---	---	---	---	---	---	---
Sweagert--------	0-3	Gravelly sandy loam.	SM, GM	A-2	0	65-85	55-75	45-65	25-35	20-30	NP-5
	3-6	Loam-------------	CL-ML, ML, CL	A-4	0	85-100	75-100	70-85	50-65	25-35	5-10
	6-24	Clay loam, loam, sandy clay loam.	CL	A-6	0	85-100	75-100	70-90	50-70	30-40	10-15
	24-26	Gravelly clay loam, gravelly clay.	GC, CL, SC	A-6, A-7	0	60-85	50-75	45-65	40-60	35-50	15-25
	26-60	Indurated--------	---	---	---	---	---	---	---	---	---
273:											
Oxendine--------	0-6	Very cobbly sandy loam.	GM	A-2	25-45	45-65	40-60	30-50	25-35	20-30	NP-5
	6-11	Sandy clay loam, clay loam.	SC, CL	A-6	0-10	80-90	75-90	70-80	35-60	30-40	10-15
	11-13	Very gravelly sandy clay loam.	GC, SC	A-2	10-25	45-65	35-55	30-45	20-30	30-40	10-15
	13-20	Indurated--------	---	---	---	---	---	---	---	---	---
	20-24	Weathered bedrock	---	---	---	---	---	---	---	---	---
Sweagert--------	0-3	Gravelly sandy loam.	SM, GM	A-2	0	65-85	55-75	45-65	25-35	20-30	NP-5
	3-6	Loam-------------	CL-ML, ML, CL	A-4	0	85-100	75-100	70-85	50-65	25-35	5-10
	6-24	Clay loam, loam, sandy clay loam.	CL	A-6	0	85-100	75-100	70-90	50-70	30-40	10-15
	24-26	Gravelly clay loam, gravelly clay.	GC, CL, SC	A-6, A-7	0	60-85	50-75	45-65	40-60	35-50	15-25
	26-60	Indurated--------	---	---	---	---	---	---	---	---	---
274------------- Pastolla	0-5	Muck-------------	OH	A-7	0	100	100	95-100	85-95	100-125	10-20
	5-10	Mucky silt loam	MH	A-7	0	100	100	90-100	75-90	75-100	10-20
	10-24	Stratified very fine sandy loam to silt loam.	MH	A-5	0	100	100	85-100	55-90	70-95	NP-5
	24-31	Stratified loam to silty clay.	MH, ML	A-7	0	100	100	85-100	65-95	45-70	10-25
	31-44	Stratified loam to clay.	MH	A-7, A-5	0	100	100	85-100	65-95	70-100	5-25
	44-60	Coarse sandy loam	MH	A-5	0	100	100	60-70	50-65	50-70	NP-5

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
275-------------- Pastolla	0-5	Muck-------------	OH	A-7	0	100	100	95-100	85-95	100-125	10-20
	5-19	Mucky silt loam	MH	A-7	0	100	100	90-100	75-90	75-100	10-20
	19-22	Stratified very fine sandy loam to silt loam.	MH	A-5	0	100	100	85-100	55-90	70-95	NP-5
	22-38	Stratified loam to silty clay.	MH, ML	A-7	0	100	100	85-100	65-95	45-70	10-25
	38-55	Stratified loam to clay.	MH	A-7, A-5	0	100	100	85-100	65-95	70-100	5-25
	55-64	Coarse sandy loam	MH	A-5	0	100	100	60-70	50-65	50-70	NP-5
276-------------- Pastolla	0-5	Mucky silt loam	MH	A-7	0	100	100	90-100	75-90	75-100	10-20
	5-22	Stratified very fine sandy loam to silt loam.	MH	A-5	0	100	100	85-100	55-90	70-95	NP-5
	22-34	Stratified loam to silty clay.	MH, ML	A-7	0	100	100	85-100	65-95	45-70	10-25
	34-64	Stratified loam to clay.	MH	A-7, A-5	0	100	100	85-100	65-95	70-100	5-25
277-------------- Patburn	0-2	Loam-------------	SM, SC-SM, SC	A-4	0	80-100	75-100	60-80	40-50	25-35	5-10
	2-13	Clay loam--------	CL	A-7	0	80-100	75-100	70-95	55-75	40-50	20-25
	13-32	Clay-------------	CL, SC	A-7	0	80-100	75-100	65-90	40-55	40-50	20-25
	32-50	Loam, clay loam	CL	A-6	0	80-100	75-100	70-95	55-75	30-40	15-25
	50-72	Sandy clay loam, clay loam.	CL	A-6	0	80-100	75-100	60-80	50-70	30-40	10-20
278-------------- Patburn	0-2	Clay loam--------	CL	A-6	0	80-100	75-100	65-90	50-65	35-40	15-20
	2-24	Clay-------------	CL, SC	A-7	0	80-100	75-100	65-90	40-55	40-50	20-25
	24-65	Sandy clay loam, clay loam.	CL	A-6	0	80-100	75-100	60-80	50-70	30-40	10-20
279-------------- Pit	0-4	Silty clay-------	MH, CH	A-7	0	100	100	95-100	85-95	50-65	20-35
	4-40	Silty clay loam, silty clay, clay.	CL, CH	A-7	0	100	100	95-100	85-95	40-65	15-35
	40-45	Silty clay loam, clay loam.	ML, CL	A-6, A-7	0	100	100	90-100	75-90	30-50	10-20
	45-60	Silt loam--------	ML	A-4	0	100	100	90-100	70-85	30-40	5-10
280-------------- Pit	0-4	Silty clay-------	MH, CH	A-7	0	100	100	95-100	85-95	50-65	20-35
	4-43	Silty clay loam, silty clay, clay.	CL, CH	A-7	0	100	100	95-100	85-95	40-65	15-35
	43-64	Silt loam--------	ML	A-4	0	100	100	90-100	70-85	30-40	5-10
281: Pits.											
Dumps.											
282, 283, 284, 285------------- Pittville	0-9	Sandy loam-------	SC, SC-SM	A-2	0	85-100	80-100	55-65	30-35	10-20	5-10
	9-41	Sandy clay loam	CL	A-6	0	95-100	90-100	75-90	50-55	30-35	10-15
	41-84	Stratified sandy loam to sand.	SM, SC-SM	A-1, A-2	0	85-90	75-90	45-60	15-25	10-15	NP-5
	84-94	Cemented---------	---	---	---	---	---	---	---	---	---
286-------------- Ponto	0-8	Sandy loam-------	SM	A-4	0-5	80-100	75-100	50-75	35-50	20-30	NP-5
	8-45	Sandy loam, loam	SM, ML	A-4	0-10	80-100	75-95	50-80	35-60	20-30	NP-5
	45-60	Stony sandy loam, stony loam.	SM	A-2, A-4	0-15	75-85	65-80	50-75	30-50	20-30	NP-5

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
287:											
Ponto-----------	0-6	Sandy loam-------	SM	A-4	0-5	80-100	75-100	50-75	35-50	20-30	NP-5
	6-62	Sandy loam, loam	SM, ML	A-4	0-10	80-100	75-95	50-80	35-60	20-30	NP-5
Neer------------	0-10	Gravelly sandy loam.	SM, GM	A-1, A-2	0-15	60-90	50-75	30-50	20-35	25-35	NP-5
	10-24	Very gravelly sandy loam.	GM, SM	A-1	0-20	30-70	25-50	20-40	10-25	25-35	NP-5
	24-39	Very gravelly sandy loam.	GM, SM	A-1	0-20	30-70	25-50	20-40	10-25	25-35	NP-5
	39-43	Weathered bedrock	---	---	---	---	---	---	---	---	---
288:											
Ponto-----------	0-8	Sandy loam-------	SM	A-4	0-5	80-100	75-100	50-75	35-50	20-30	NP-5
	8-45	Sandy loam, loam	SM, ML	A-4	0-10	80-100	75-95	50-80	35-60	20-30	NP-5
	45-60	Stony sandy loam, stony loam.	SM	A-2, A-4	0-15	75-85	65-80	50-75	30-50	20-30	NP-5
Wyntoon---------	0-9	Sandy loam-------	SM	A-4	0-5	85-100	80-100	55-65	35-50	20-30	NP-5
	9-25	Loam-------------	CL-ML, CL, ML	A-4	0-5	85-100	80-100	65-85	50-60	25-35	5-10
	25-49	Silty clay loam, clay loam.	ML	A-7	0-5	90-100	85-100	80-95	75-85	40-50	10-20
	49-74	Clay-------------	ML, MH	A-7	0-5	90-100	85-100	85-100	80-95	45-55	15-25
289:											
Quaking---------	0-3	Very gravelly loamy coarse sand.	GP-GM, GW-GM, GM, GM-GC	A-1	0	30-55	25-50	15-30	5-15	20-25	NP-5
	3-7	Extremely gravelly sand.	GP, GP-GM	A-1	0	10-30	5-25	0-15	0-5	0-14	NP
	7-14	Gravelly coarse sandy loam.	GM-GC, GM, SC, SM	A-1, A-2	0	55-80	50-75	30-50	15-30	20-25	NP-5
	14-21	Very gravelly sandy loam.	GM-GC, GP-GC, GC	A-1, A-2	0	30-55	25-50	15-30	10-20	20-25	5-10
	21-32	Extremely gravelly sandy clay loam.	GP, GM-GC, GC, GP-GC	A-1, A-2	0	15-30	10-25	5-20	0-15	25-30	5-10
	32-64	Extremely gravelly coarse sandy loam.	GP, GP-GC	A-1, A-2	10-30	10-30	5-25	0-20	0-10	20-25	5-10
Kephart---------	0-3	Very gravelly loamy coarse sand.	GP, SP, GP-GM, SP-SM	A-1	0	30-55	25-50	15-30	0-5	20-25	NP-5
	3-8	Extremely gravelly coarse sand.	GP	A-1	0	10-30	5-25	0-15	0-5	---	NP
	8-19	Coarse sandy loam	SM, SC-SM	A-2	0	80-95	75-90	45-60	25-35	20-25	NP-5
	19-25	Sandy loam-------	SC-SM, SC	A-2	0	80-95	75-90	45-60	25-35	20-25	5-10
	25-68	Sandy clay loam	SC-SM, SC	A-2, A-4	0	80-95	75-90	65-80	30-50	25-30	5-10
290------------- Ravendale	0-16	Silty clay-------	CH	A-7	0-5	95-100	95-100	90-100	70-95	50-70	25-40
	16-36	Clay, silty clay	CH	A-7	0	100	100	95-100	75-95	50-70	25-40
	36-48	Clay, silty clay, clay loam.	CH, CL	A-7	0	95-100	95-100	95-100	70-95	45-70	20-40
	48-57	Gravelly sandy loam.	SC-SM, SC	A-1, A-2	0	70-85	60-75	35-50	20-30	20-30	5-10
	57-67	Weathered bedrock	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
291-------------- Revit	0-20	Fine sandy loam	SM	A-2, A-4	0-5	80-95	75-95	55-75	25-50	20-30	NP-5
	20-30	Gravelly fine sandy loam, gravelly sandy loam.	SM, GM	A-1, A-2	0-10	60-85	50-75	35-55	15-35	20-30	NP-5
	30-36	Extremely stony fine sandy loam, extremely stony sandy loam.	GM, SM, GP-GM, SP-SM	A-1, A-2	10-20	30-80	25-75	20-55	10-35	20-30	NP-5
	36-46	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
292, 293, 294:											
Ricketts--------	0-10	Very cobbly loam	SC-SM, SM, GM-GC, GM	A-4	30-45	65-75	60-70	45-60	35-50	25-35	5-10
	10-26	Very cobbly loam, very cobbly clay loam.	SC, GC	A-6	40-60	55-75	50-70	45-60	35-50	30-40	10-15
	26-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Orhood----------	0-3	Very cobbly loam	GM, SM	A-4	25-40	55-75	50-70	45-60	35-50	25-35	NP-5
	3-8	Very cobbly loam	GM-GC, GC, SC-SM, SC	A-4, A-6	20-40	55-75	50-70	45-65	35-50	25-35	5-15
	8-16	Very cobbly loam, very cobbly clay loam, very stony clay loam.	GM-GC, GC	A-4, A-6	25-35	60-70	55-65	45-60	35-50	25-40	5-20
	16-20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
295:											
Ricketts--------	0-5	Sandy loam-------	SM	A-4	0	85-100	75-100	50-70	35-50	20-30	NP-5
	5-12	Loam-------------	ML	A-4	0	85-100	75-100	65-85	50-65	25-35	NP-10
	12-22	Very gravelly loam.	GM-GC, GM, GC	A-1, A-2	0-5	35-60	25-50	20-40	15-30	25-35	5-10
	22-33	Extremely gravelly loam.	GP-GM, GP-GC	A-1, A-2	0-5	20-35	10-25	5-20	5-10	25-35	5-10
	33-43	Weathered bedrock	---	---	---	---	---	---	---	---	---
Sweagert--------	0-10	Loam-------------	CL-ML, ML, CL	A-4	0-5	100	90-100	75-85	50-60	25-35	5-10
	10-16	Clay loam--------	CL	A-6	0	100	90-100	80-90	65-75	30-40	10-15
	16-23	Extremely gravelly sandy loam.	GP-GM	A-1	0-5	20-35	10-25	5-15	5-10	20-30	NP-5
	23-35	Silty clay loam, clay loam.	CL	A-6	0	85-100	75-100	70-85	65-80	30-40	10-15
	35-45	Weathered bedrock	---	---	---	---	---	---	---	---	---
296:											
Ricketts--------	0-5	Sandy loam-------	SM	A-4	0	85-100	75-100	50-70	35-50	20-30	NP-5
	5-12	Loam-------------	ML	A-4	0	85-100	75-100	65-85	50-65	25-35	NP-10
	12-22	Very gravelly loam.	GM-GC, GM, GC	A-1, A-2	0-5	35-60	25-50	20-40	15-30	25-35	5-10
	22-33	Extremely gravelly loam.	GP-GM, GP-GC	A-1, A-2	0-5	20-35	10-25	5-20	5-10	25-35	5-10
	33-43	Weathered bedrock	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
296:											
Searvar----------	0-6	Gravelly loam----	GM, SM	A-4	0-5	55-80	50-75	45-65	35-50	25-35	NP-10
	6-18	Very cobbly loam	SM, GM	A-4	40-60	60-80	55-75	50-65	35-50	25-35	NP-10
	18-28	Very cobbly loam	SM, SC-SM, GM, GM-GC	A-4	40-60	60-80	55-75	50-65	35-50	25-35	5-10
	28-53	Weathered bedrock	---	---	---	---	---	---	---	---	---
	53-63	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
297-------------- Rivalier	0-4	Very gravelly sandy loam.	GM, SM	A-1	5-15	35-60	30-55	20-35	15-20	0-14	NP
	4-27	Very gravelly sandy loam.	GM, SM	A-1	15-30	40-60	35-55	20-35	15-20	20-30	NP-5
	27-37	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
298-------------- Rivalier	0-11	Very gravelly sandy loam.	GM, SM	A-1	5-15	35-60	30-55	20-35	15-20	0-14	NP
	11-24	Very gravelly sandy loam.	GM, SM	A-1	15-30	40-60	35-55	20-35	15-20	20-30	NP-5
	24-28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
299-------------- Rivalier	0-2	Very gravelly sandy loam.	GM, SM	A-1	5-15	35-60	30-55	20-35	15-20	0-14	NP
	2-20	Very gravelly sandy loam.	GM, SM	A-1	15-30	40-60	35-55	20-35	15-20	20-30	NP-5
	20-24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
300-------------- Riverwash	6-60	Stratified gravelly sand to extremely gravelly coarse sand.	GP, SP, GW, SW	A-1	0-25	25-55	25-50	10-30	0-5	---	NP
301:											
Roundbarn--------	0-10	Gravelly sandy loam.	SM, GM	A-2	0-5	55-80	50-75	35-50	25-35	20-30	NP-5
	10-24	Very cobbly sandy loam.	SC-SM, GC, GM-GC	A-2	40-60	65-80	60-75	40-50	25-35	25-30	5-10
	24-41	Very cobbly sandy clay loam.	SC, GC	A-2	40-60	65-80	60-75	50-65	25-35	30-40	10-15
	41-50	Very cobbly sandy loam.	SC-SM, GC, GM-GC	A-2	40-60	65-80	60-75	40-50	25-35	25-30	5-10
	50-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Said------------	0-8	Gravelly loam----	GM, SM	A-4	0-5	60-80	55-75	45-65	35-50	25-35	NP-10
	8-41	Gravelly loam, cobbly loam.	SC-SM, SM, SC	A-4	0-30	75-90	70-85	55-65	35-50	25-35	5-10
	41-50	Very gravelly clay loam, very cobbly clay loam.	GC	A-6	0-60	50-65	45-60	40-55	35-50	30-40	10-20
	50-54	Weathered bedrock	---	---	---	---	---	---	---	---	---
302:											
Rubble land------	0-60	Fragmental material.	GP	A-1	30-50	0-10	0-5	0-5	0-5	---	NP

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
302:											
Argixerolls-----	0-7	Stony sandy loam	SM, GM	A-2, A-1	5-15	60-80	50-75	30-50	15-30	20-30	NP-5
	7-15	Stony sandy clay loam, very stony sandy clay loam.	GC, SC	A-2	0-10	45-80	35-60	30-55	15-35	30-35	10-15
	15-25	Extremely stony sandy clay loam, extremely cobbly sandy clay loam.	GC, GP	A-2	25-60	20-30	10-25	5-25	0-15	35-40	15-20
	25-29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
303:											
Rubble land-----	0-60	Fragmental material.	GP	A-1	30-50	0-10	0-5	0-5	0-5	---	NP
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
304:											
Rubble land-----	0-60	Fragmental material.	GP	A-1	30-50	0-10	0-5	0-5	0-5	---	NP
Typic Vitrixerands---	0-3	Very gravelly sandy loam.	GM, SM, GP-GM, GM-GC	A-1, A-2	0-5	30-50	25-50	15-50	10-35	20-25	NP-5
	3-6	Very gravelly sandy loam.	GM, SM, SC-SM, GM-GC	A-1, A-2	0-5	30-50	10-50	15-50	10-35	20-25	NP-5
	6-13	Extremely gravelly loamy sand.	GP, GP-GM, GM, SP	A-1, A-2, A-3	0-5	15-25	10-25	5-25	0-20	---	NP
	13-25	Very gravelly sandy loam.	GM, SM, GP-GM, GM-GC	A-1, A-2	0-5	20-50	10-50	15-50	10-35	20-25	NP-5
	25-33	Extremely gravelly loamy sand.	GP, GW-GM, GM, SP	A-1, A-2, A-3	0-5	15-25	10-25	5-25	0-20	---	NP
	33-67	Extremely gravelly loamy sand, extremely gravelly sandy loam.	GP, GP-GM, GM, GM-GC	A-1	0-5	15-30	10-25	5-20	0-15	20-25	NP-5
305:											
Rubble land-----	0-60	Fragmental material.	GP	A-1	30-50	0-10	0-5	0-5	0-5	---	NP
Xerorthents-----	0-3	Loam-------------	SM, SC-SM	A-2-4, A-4	0-5	95-100	90-100	55-70	25-40	20-25	NP-5
	3-22	Cobbly sandy loam	SM, GM, GM-GC, SC-SM	A-2-4, A-1-b	5-25	60-90	60-85	35-55	15-30	20-25	NP-5
	22-34	Very cobbly sandy loam.	SM, GM, GM-GC, SC-SM	A-2-4, A-1-b	5-25	60-90	60-85	35-55	15-30	20-25	NP-5
	34-38	Weathered bedrock	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
306, 307--------- Scarface	0-16	Sandy loam-------	SM	A-4	0	85-95	75-85	50-60	35-50	20-30	NP-5
	16-24	Sandy loam-------	SM	A-4	0	85-95	75-85	50-60	35-50	20-30	NP-5
	24-37	Gravelly sandy clay loam.	SC-SM, SM	A-2	0	80-85	70-75	60-70	25-35	25-35	5-10
	37-52	Gravelly sandy clay loam.	SC-SM, SM	A-2	10-15	75-85	65-75	50-60	25-35	25-35	5-10
	52-84	Gravelly sandy clay loam, gravelly clay loam.	SC	A-2, A-6	0	60-80	50-75	45-60	25-50	30-40	10-15
308:											
Scarface--------	0-16	Sandy loam-------	SM	A-4	0	85-95	75-85	50-60	35-50	20-30	NP-5
	16-24	Sandy loam-------	SM	A-4	0	85-95	75-85	50-60	35-50	20-30	NP-5
	24-37	Gravelly sandy clay loam.	SC-SM, SM	A-2	0	80-85	70-75	60-70	25-35	25-35	5-10
	37-52	Gravelly sandy clay loam.	SC-SM, SM	A-2	10-15	75-85	65-75	50-60	25-35	25-35	5-10
	52-84	Gravelly sandy clay loam, gravelly clay loam.	SC	A-2, A-6	0	60-80	50-75	45-60	25-50	30-40	10-15
Gasper----------	0-4	Gravelly sandy loam.	SM	A-2	10-15	80-90	75-85	50-60	25-35	20-30	NP-5
	4-16	Gravelly sandy loam.	SC-SM, SC	A-2	10-15	80-90	75-85	50-60	25-35	20-30	5-10
	16-38	Very cobbly sandy loam, extremely stony sandy loam.	SC-SM, SC	A-2	20-45	70-80	65-75	45-55	25-35	20-30	5-10
	38-60	Very cobbly sandy clay loam.	SC, GC	A-2	15-25	60-75	55-70	50-65	25-35	25-35	10-15
309------------- Shasta	0-13	Loamy sand-------	SM	A-1, A-2	0	85-100	75-100	40-60	15-30	0-14	NP
	13-30	Loamy sand, loamy fine sand.	SM	A-1, A-2	0	85-100	75-100	40-60	15-30	0-14	NP
	30-70	Stratified sand to extremely gravelly loamy sand.	SP-SM, SM, GM	A-1	0	55-80	50-75	25-40	5-25	0-14	NP
310------------- Shastina	0-6	Loam-------------	ML, CL-ML	A-4	0	80-95	75-95	65-80	50-60	20-25	NP-5
	6-15	Gravelly sandy loam, gravelly fine sandy loam.	SM, GM, GM-GC, SC-SM	A-2	5-10	60-80	55-75	45-65	25-35	20-25	NP-5
	15-36	Very cobbly sandy loam, extremely cobbly sandy loam.	GM, SM	A-1, A-2	40-65	35-75	30-70	25-60	15-30	0-14	NP
	36-60	Extremely cobbly loamy coarse sand.	GM, GP-GM	A-1	50-75	40-50	35-45	25-35	10-15	0-14	NP

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
311:											
Splawn	0-3	Very cobbly loam	GM, GM-GC, SM, SC-SM	A-4	40-50	50-80	45-75	40-65	35-50	25-35	5-10
	3-10	Very gravelly loam.	GM, GM-GC, SM	A-2, A-1	15-30	35-65	30-60	25-50	20-35	25-35	5-10
	10-17	Very gravelly clay loam.	GC	A-2, A-6	15-30	35-65	30-60	25-55	20-50	30-40	15-25
	17-24	Extremely gravelly clay loam, extremely gravelly clay.	GC, GP-GC	A-2	15-25	20-35	15-30	15-25	10-25	40-60	20-35
	24-34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Jellico	0-5	Very stony silt loam.	ML	A-4	20-30	75-95	70-90	65-85	50-70	25-35	NP-10
	5-27	Very stony silt loam, very cobbly silt loam.	CL-ML, CL	A-4, A-6	20-30	65-95	60-90	55-85	50-70	25-35	5-15
	27-33	Extremely stony silt loam, very cobbly silt loam.	CL-ML, CL	A-4, A-6	30-40	70-90	65-85	60-80	50-70	25-35	5-15
	33-37	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
312, 313 Stacher	0-2	Gravelly coarse sandy loam.	SM	A-1, A-2	0	55-80	50-75	30-50	20-30	20-25	NP-5
	2-12	Gravelly coarse sandy loam.	SC-SM	A-1, A-2	0	55-80	50-75	30-50	20-30	25-30	5-10
	12-23	Very gravelly sandy clay loam.	GC, GM-GC	A-1, A-2	0	30-50	25-50	20-45	15-30	25-30	5-10
	23-65	Extremely gravelly sandy clay loam.	GP, GM-GC, GC	A-1, A-2	0-30	15-30	10-25	5-20	0-15	25-30	5-10
	65-69	Weathered bedrock	---	---	---	---	---	---	---	---	---
314 Stacher	0-4	Very gravelly coarse sandy loam.	GM	A-1	0	30-50	25-50	15-35	10-25	20-25	NP-5
	4-14	Gravelly coarse sandy loam.	SC-SM	A-1, A-2	0	55-80	50-75	30-50	20-30	25-30	5-10
	14-25	Very gravelly sandy clay loam.	GC, GM-GC	A-1, A-2	0	30-50	25-50	20-45	15-30	25-30	5-10
	25-65	Extremely gravelly sandy clay loam.	GP, GM-GC, GC	A-1, A-2	0-30	15-30	10-25	5-20	0-15	25-30	5-10
	65-75	Weathered bedrock	---	---	---	---	---	---	---	---	---
315 Stoner	0-6	Gravelly sandy loam.	SM, GM	A-2	0-5	55-80	50-75	35-60	25-35	20-25	NP-5
	6-42	Gravelly sandy loam, gravelly loam.	SM, GM	A-2, A-4	0-5	55-80	50-75	35-65	25-50	20-25	NP-5
	42-74	Very gravelly loam, very gravelly sandy loam.	GM, GM-GC	A-1, A-2	0-5	30-55	25-50	20-50	15-30	20-30	NP-10

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
316:											
Stukel gravelly sandy loam-----	0-4	Gravelly sandy loam.	SM, GM, SC-SM	A-2	0-5	60-80	50-75	40-65	25-35	10-15	NP-5
	4-16	Sandy loam-------	SM, SC-SM	A-2, A-4	0	80-90	75-85	50-70	25-40	10-15	NP-5
	16-26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Stukel very cobbly sandy loam----------	0-4	Very cobbly sandy loam.	SM, SC-SM	A-2	40-60	80-90	75-85	45-55	25-35	10-15	NP-5
	4-11	Sandy loam-------	SM, SC-SM	A-2	0	80-90	75-85	45-55	25-35	10-15	NP-5
	11-20	Cobbly sandy loam	SM, SC-SM	A-2	10-30	80-95	75-90	45-60	25-35	10-15	NP-5
	20-24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
317------------- Swanberger	0-17	Clay-------------	CL	A-7	0	100	100	90-100	85-95	40-50	20-30
	17-52	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	85-95	40-60	15-45
	52-62	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	85-95	40-60	15-45
318------------- Swanberger	0-5	Muck-------------	OH	A-7	0	100	100	90-100	85-95	100-125	10-15
	5-15	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	85-95	40-60	15-45
	15-41	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	85-95	40-60	15-45
	41-45	Silty clay-------	CL, CH	A-7	0	100	100	90-100	85-95	40-60	15-45
	45-75	Clay loam--------	CL	A-6	0	100	100	90-100	85-95	35-40	15-20
319------------- Sweagert	0-7	Loam-------------	CL-ML, ML, CL	A-4	0	90-100	80-100	70-95	50-65	25-35	5-10
	7-25	Clay loam, loam	CL	A-6	0	90-100	80-100	70-95	55-75	30-40	10-15
	25-35	Clay loam, clay	CL	A-6, A-7	0	90-100	80-95	75-95	60-85	35-50	15-25
	35-60	Indurated--------	---	---	---	---	---	---	---	---	---
320, 321--------- Tionesta	0-5	Very gravelly loamy coarse sand.	GM, GW-GM, GP-GM, GM-GC	A-1	0	35-55	25-50	15-30	5-15	20-25	NP-5
	5-15	Extremely gravelly coarse sand.	GP, GW-GM, GP-GM	A-1	0	10-30	5-25	0-15	0-10	---	NP
	15-31	Gravelly coarse sandy loam.	SM, GM, GM-GC, SC-SM	A-1, A-2	0-15	60-80	55-75	35-45	15-30	20-25	NP-5
	31-53	Extremely gravelly coarse sandy loam.	GP, GW-GM, GM, GM-GC	A-1	15-45	15-35	10-30	5-20	0-15	20-25	NP-5
	53-70	Extremely gravelly loamy coarse sand.	GP, GP-GM	A-1	15-45	15-35	10-30	5-20	0-5	---	NP
322:											
Trojan----------	0-4	Loam-------------	CL-ML, CL, ML	A-4	0-5	90-100	85-95	70-85	50-70	25-35	5-10
	4-14	Cobbly loam------	CL-ML, CL, ML	A-4	25-40	95-100	90-95	75-85	60-70	25-35	5-10
	14-31	Gravelly clay loam, gravelly sandy clay loam.	GC, SC, CL	A-2, A-6	0-5	55-80	50-75	45-70	25-55	30-40	10-20
	31-48	Very gravelly clay loam, very gravelly sandy clay loam.	GC	A-2	5-25	45-55	40-50	30-45	25-35	30-40	10-20
	48-58	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
322:											
Erig------------	0-19	Gravelly loam----	SM, GM, GC, SC	A-4	0-10	55-80	50-75	45-70	35-50	25-35	5-10
	19-48	Very cobbly clay loam.	GC, CL	A-6	25-60	60-70	55-65	50-60	40-55	30-40	10-15
	48-52	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
323-------------- Twinbuttes	0-3	Very gravelly coarse sandy loam.	GM, GP-GM, GM-GC	A-1	0	30-55	25-50	15-30	10-20	20-25	NP-5
	3-7	Extremely gravelly coarse sandy loam.	GP, GW-GM, GM, GM-GC	A-1	0	10-30	5-25	0-20	0-15	20-25	NP-5
	7-34	Extremely gravelly coarse sandy loam.	GP, GW-GM, GM, GM-GC	A-1	0	10-30	5-25	0-20	0-15	20-25	NP-5
	34-49	Extremely gravelly loamy coarse sand, extremely gravelly coarse sandy loam.	GP	A-1	0	10-15	5-10	0-5	0-5	20-25	NP-5
	49-72	Extremely gravelly coarse sand.	GP	A-1	0	10-15	5-10	0-5	0-5	20-25	NP-5
324:											
Twinbuttes------	0-3	Very gravelly coarse sandy loam.	GM, GP-GM, GM-GC	A-1	0	30-55	25-50	15-30	10-20	20-25	NP-5
	3-7	Extremely gravelly coarse sandy loam.	GP, GW-GM, GM, GM-GC	A-1	0	10-30	5-25	0-20	0-15	20-25	NP-5
	7-34	Extremely gravelly coarse sandy loam.	GP, GW-GM, GM, GM-GC	A-1	0	10-30	5-25	0-20	0-15	20-25	NP-5
	34-49	Extremely gravelly loamy coarse sand, extremely gravelly coarse sandy loam.	GP	A-1	0	10-15	5-10	0-5	0-5	20-25	NP-5
	49-72	Extremely gravelly coarse sand.	GP	A-1	0	10-15	5-10	0-5	0-5	20-25	NP-5
Lava flows------	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
325, 326, 327---- Wengler	0-4	Very gravelly coarse sandy loam.	GM, GP-GM, GM-GC	A-1	0-10	35-55	30-50	15-30	10-20	20-25	NP-5
	4-12	Very gravelly coarse sandy loam.	GM, GP-GM, GM-GC	A-1	0-10	35-55	30-50	15-30	10-20	20-25	NP-5
	12-17	Very gravelly coarse sandy loam.	GM, GP-GM, GM-GC	A-1	0-15	30-55	25-50	15-30	10-20	20-25	NP-5
	17-25	Extremely gravelly loamy coarse sand.	GP, GP-GM	A-1	0-25	15-30	10-25	5-15	0-10	20-25	NP-5
	25-47	Extremely gravelly sand.	GP	A-1	0-30	15-30	10-25	5-15	0-5	20-25	NP-5
	47-80	Extremely gravelly loamy coarse sand.	GP, GP-GM	A-1	0-30	15-30	10-25	5-15	0-10	20-25	NP-5
328: Whipp-----------	0-1	Silt loam--------	ML	A-4	0	100	100	90-100	70-90	25-35	NP-10
	1-3	Silty clay loam, silt loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	85-95	25-40	5-15
	3-16	Silty clay-------	CH, CL	A-7	0	100	100	95-100	90-95	45-60	20-30
	16-22	Silty clay loam	CL, ML	A-7	0	100	100	95-100	85-95	40-50	15-20
	22-25	Indurated--------	---	---	---	---	---	---	---	---	---
	25-60	Fine sandy loam	SM	A-4	0	100	95-100	60-70	35-50	20-30	NP-5
Cupvar----------	0-21	Silty clay-------	CH	A-7	0	100	100	95-100	90-95	50-65	25-40
	21-25	Cemented---------	---	---	---	---	---	---	---	---	NP
	25-64	Fine sandy loam, sandy loam, sandy clay loam.	SM, SC-SM, SC	A-4	0	100	95-100	60-70	35-50	10-20	NP-10
329: Whipp-----------	0-1	Silt loam--------	ML	A-4	0	100	100	90-100	70-90	25-35	NP-10
	1-3	Silty clay loam, silt loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	85-95	25-40	5-15
	3-16	Silty clay-------	CH, CL	A-7	0	100	100	95-100	90-95	45-60	20-30
	16-22	Silty clay loam	CL, ML	A-7	0	100	100	95-100	85-95	40-50	15-20
	22-25	Indurated--------	---	---	---	---	---	---	---	---	---
	25-60	Fine sandy loam	SM	A-4	0	100	95-100	60-70	35-50	20-30	NP-5
Cupvar----------	0-28	Silty clay-------	CH	A-7	0	100	100	95-100	90-95	50-65	25-40
	28-41	Cemented---------	---	---	---	---	---	---	---	---	NP
	41-60	Fine sandy loam, sandy loam, sandy clay loam.	SM, SC-SM, SC	A-4	0	100	95-100	60-70	35-50	10-20	NP-10
330-------------- Winnibulli	0-11	Loam-------------	CL-ML, CL	A-4	0	95-100	90-100	80-90	50-65	25-35	5-10
	11-55	Clay loam--------	CL	A-6	0	95-100	90-100	80-95	60-85	30-40	10-15
	55-72	Sandy clay loam	SC-SM, SC	A-4, A-6	0	95-100	90-100	75-90	35-50	25-35	5-15
	72-87	Sandy loam-------	SM	A-4	0	95-100	90-100	50-65	35-50	20-30	NP-5
331-------------- Winnibulli	0-7	Loam-------------	CL-ML, ML, CL	A-4	0	95-100	90-100	80-90	50-65	25-35	5-10
	7-15	Clay loam--------	CL	A-6	0	95-100	90-100	80-95	60-85	30-40	10-15
	15-40	Sandy clay loam	SC-SM, SC	A-4, A-6	0	95-100	90-100	75-90	35-50	25-35	5-15
	40-50	Sandy loam-------	SM	A-4	0	95-100	90-100	50-65	35-50	20-30	NP-5
	50-75	Extremely gravelly sandy loam.	GP-GM, GM, GM-GC	A-1	0-5	20-30	15-25	15-20	10-15	15-20	NP-5

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
332:											
Winnibulli	0-11	Loam	CL-ML, CL	A-4	0	95-100	90-100	80-90	50-65	25-35	5-10
	11-55	Clay loam	CL	A-6	0	95-100	90-100	80-95	60-85	30-40	10-15
	55-72	Sandy clay loam	SC-SM, SC	A-4, A-6	0	95-100	90-100	75-90	35-50	25-35	5-15
	72-87	Sandy loam	SM	A-4	0	95-100	90-100	50-65	35-50	20-30	NP-5
Burman	0-8	Loam	ML, CL-ML, CL	A-4	0	95-100	90-100	80-90	50-70	25-35	5-10
	8-33	Clay loam	ML, CL	A-6, A-7	0	100	95-100	90-95	70-80	35-45	10-20
	33-39	Indurated	---	---	---	---	---	---	---	---	---
	39-72	Stratified sandy loam to silt loam.	SM, SC-SM	A-4	0	90-100	80-100	50-90	35-50	20-25	NP-5
333, 334:											
Witcher	0-4	Sandy loam	SM	A-4	0	85-100	75-100	50-70	35-50	20-30	NP-5
	4-36	Sandy clay loam	SC, SC-SM	A-4, A-6	0	85-100	75-100	65-85	35-50	25-40	5-15
	36-47	Very gravelly clay loam, very gravelly sandy clay loam.	GC	A-2	0	35-60	25-50	20-40	15-30	30-40	10-15
	47-57	Weathered bedrock	---	---	---	---	---	---	---	---	---
Gosch	0-3	Gravelly sandy loam.	SM, GM	A-2	0-5	60-80	55-75	45-65	25-35	20-30	NP-5
	3-9	Extremely stony sandy loam.	SM	A-2	10-20	85-95	75-85	50-65	25-35	20-30	NP-5
	9-32	Extremely stony sandy clay loam, extremely stony clay loam.	CL, SC	A-6	25-30	85-95	75-85	65-75	35-60	30-40	10-15
	32-50	Extremely gravelly clay loam.	GP-GC	A-2	0-10	10-35	5-25	5-15	5-10	30-40	10-15
	50-54	Weathered bedrock	---	---	---	---	---	---	---	---	---
335, 336 Wyntoon	0-9	Sandy loam	SM	A-4	0-5	85-100	80-100	55-65	35-50	20-30	NP-5
	9-25	Loam	CL-ML, CL, ML	A-4	0-5	85-100	80-100	65-85	50-60	25-35	5-10
	25-49	Silty clay loam, clay loam.	ML	A-7	0-5	90-100	85-100	80-95	75-85	40-50	10-20
	49-74	Clay	ML, MH	A-7	0-5	90-100	85-100	85-100	80-95	45-55	15-25
337:											
Wyntoon	0-9	Sandy loam	SM	A-4	0-5	85-100	80-100	55-65	35-50	20-30	NP-5
	9-25	Loam	CL-ML, CL, ML	A-4	0-5	85-100	80-100	65-85	50-60	25-35	5-10
	25-49	Silty clay loam, clay loam.	ML	A-7	0-5	90-100	85-100	80-95	75-85	40-50	10-20
	49-74	Clay	ML, MH	A-7	0-5	90-100	85-100	85-100	80-95	45-55	15-25
Depner	0-16	Gravelly sandy loam.	SM	A-1, A-2	0-10	80-95	55-75	35-65	20-30	15-25	NP-5
	16-37	Very cobbly sandy loam, very cobbly loam.	SM, SC, SC-SM	A-2, A-1	15-50	65-70	55-65	20-50	20-35	20-30	NP-10
	37-48	Very gravelly sandy loam.	SM, SC-SM, GM, GM-GC	A-2, A-1	15-25	35-70	30-65	20-45	10-30	20-30	NP-10
	48-52	Weathered bedrock	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
338, 339:											
Zeugirdor-------	0-11	Fragmental material.	GW, GP	A-1	55-80	0-5	0-5	0	0	0-14	NP
	11-17	Extremely gravelly sandy loam.	GM-GC, GC, GP-GC	A-2, A-1	10-30	25-40	20-35	15-25	10-15	20-25	5-10
	17-26	Very gravelly sandy loam.	GM-GC, SC-SM, GC, SC	A-2, A-1	10-30	40-65	35-60	25-40	10-25	20-25	5-10
	26-47	Very gravelly sandy clay loam.	GC, SC	A-2	10-30	40-65	35-60	30-50	20-35	25-30	10-15
	47-85	Very cobbly sandy clay loam.	SC, GC	A-2, A-6	20-55	55-90	50-85	40-65	30-50	25-30	10-15
Goulder---------	0-7	Gravelly sandy loam.	SM, GM	A-1, A-2	0-15	55-80	50-75	30-50	15-30	20-25	NP-5
	7-17	Cobbly sandy loam	SC-SM, SM	A-2	15-40	85-95	80-90	45-65	25-35	20-30	NP-10
	17-27	Cobbly loam------	CL-ML, ML	A-4	15-40	85-95	80-90	65-85	50-70	20-30	NP-10
	27-41	Very cobbly clay loam, very cobbly sandy clay loam.	SC, CL, GC	A-6, A-2	15-35	60-85	55-80	45-70	25-65	30-40	10-15
	41-58	Very gravelly clay loam, very gravelly sandy clay loam, extremely gravelly clay loam.	SC, GC	A-6, A-2	0-15	30-65	25-60	20-50	10-45	30-40	10-15
	58-64	Very bouldery clay loam.	CL	A-6	10-30	75-90	70-85	65-80	50-70	30-40	10-15

Table 16.--Physical and Chemical Properties of the Soils

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
101--------------	0-2	10-18	1.40-1.50	2.0-6.0	0.06-0.08	6.6-7.3	0-0	Low-------	0.10	1	5	1-2
Adinot	2-11	25-35	1.40-1.50	0.2-0.6	0.13-0.16	6.6-7.3	0-0	Moderate	0.20			
	11-14	35-40	1.40-1.50	0.2-0.6	0.07-0.12	6.6-7.3	0-0	Moderate	0.15			
	14-24	---	---	---	---	---	---	----------	----			
102, 103---------	0-2	15-18	1.40-1.50	2.0-6.0	0.06-0.08	6.1-7.3	0-0	Low-------	0.15	1	8	1-2
Adinot	2-6	18-27	1.40-1.50	0.6-2.0	0.12-0.16	6.6-7.3	0-0	Low-------	0.24			
	6-15	27-35	1.40-1.50	0.2-0.6	0.15-0.19	6.6-7.3	0-0	Moderate	0.32			
	15-19	---	---	---	---	---	---	----------	----			
104--------------	0-2	15-18	1.40-1.50	2.0-6.0	0.06-0.08	6.1-7.3	0-0	Low-------	0.15	1	8	1-2
Adinot	2-5	18-27	1.40-1.50	0.6-2.0	0.12-0.16	6.6-7.3	0-0	Low-------	0.24			
	5-15	27-35	1.40-1.50	0.2-0.6	0.15-0.19	6.6-7.3	0-0	Moderate	0.32			
	15-19	---	---	---	---	---	---	----------	----			
105:												
Adinot----------	0-2	10-18	1.40-1.50	2.0-6.0	0.06-0.08	6.6-7.3	0-0	Low-------	0.10	1	5	1-2
	2-11	25-35	1.40-1.50	0.2-0.6	0.13-0.16	6.6-7.3	0-0	Moderate	0.20			
	11-14	35-40	1.40-1.50	0.2-0.6	0.07-0.12	6.6-7.3	0-0	Moderate	0.15			
	14-24	---	---	---	---	---	---	----------	----			
Adinot, eroded--	0-2	15-18	1.45-1.55	2.0-6.0	0.07-0.09	6.6-7.3	0-0	Low-------	0.10	1	5	0-.5
	2-8	20-30	1.35-1.50	0.6-2.0	0.15-0.17	6.6-7.3	0-0	Low-------	0.32			
	8-12	---	---	---	---	---	---	----------	----			
106:												
Badenaugh-------	0-3	10-15	1.40-1.55	2.0-6.0	0.07-0.10	6.1-7.3	0-0	Low-------	0.10	5	5	1-3
	3-45	25-35	1.45-1.55	0.2-0.6	0.07-0.12	5.6-7.3	0-0	Low-------	0.10			
	45-60	15-30	1.45-1.55	0.6-2.0	0.03-0.08	5.6-7.3	0-0	Low-------	0.10			
Matquaw---------	0-12	8-15	0.95-1.10	2.0-6.0	0.10-0.13	6.6-7.8	0-0	Low-------	0.20	4	3	1-3
	12-33	8-15	0.95-1.10	2.0-6.0	0.10-0.13	7.4-7.8	0-0	Low-------	0.20			
	33-45	8-15	0.95-1.10	2.0-6.0	0.08-0.10	7.4-7.8	0-0	Low-------	0.15			
	45-60	8-15	0.95-1.10	2.0-6.0	0.04-0.05	7.4-7.8	0-0	Low-------	0.10			
	60-70	---	---	---	---	---	---	----------	----			
107:												
Bieber----------	0-5	5-18	1.50-1.60	0.6-2.0	0.12-0.15	6.1-7.3	0-0	Low-------	0.32	1	3	1-2
	5-11	27-35	1.40-1.50	0.2-0.6	0.17-0.19	6.1-7.3	0-0	Moderate	0.32			
	11-17	35-45	1.35-1.45	0.00-0.06	0.14-0.16	6.1-8.4	0-0	High------	0.24			
	17-60	0-0	---	---	---	---	---	----------	----			
Esperanza-------	0-5	18-27	1.10-1.20	0.6-2.0	0.16-0.19	6.1-7.8	0-0	Low-------	0.24	4	6	2-5
	5-30	35-50	1.40-1.60	0.06-0.2	0.15-0.18	6.6-7.8	0-0	High------	0.20			
	30-53	25-35	1.35-1.55	0.2-0.6	0.16-0.19	6.6-7.8	0-0	Moderate	0.20			
	53-61	---	---	---	---	---	---	----------	----			
108:												
Bieber----------	0-5	5-18	1.40-1.55	0.6-2.0	0.08-0.11	6.1-7.3	0-0	Low-------	0.20	1	4	1-2
	5-11	27-35	1.40-1.50	0.2-0.6	0.11-0.16	6.1-7.3	0-0	Moderate	0.20			
	11-19	35-45	1.35-1.45	0.00-0.06	0.11-0.14	6.1-8.4	0-2	High------	0.24			
	19-60	---	---	---	---	---	---	----------	----			
Modoc-----------	0-3	0-20	1.45-1.55	0.6-2.0	0.11-0.13	6.1-7.8	<2	Low-------	0.24	2	3	1-2
	3-32	25-35	1.35-1.50	0.2-0.6	0.15-0.19	6.6-8.4	<2	Moderate	0.28			
	32-60	---	---	---	---	---	---	----------	----			

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
109:												
Blankout--------	0-9	---	0.85-0.95	6.0-20	0.35-0.38	6.1-6.5	0-0	Low-------	0.20	5	2	2-6
	9-18	---	1.00-1.10	6.0-20	0.35-0.37	6.1-7.3	0-0	Low-------	0.20			
	18-62	15-18	1.00-1.10	6.0-20	0.08-0.12	6.1-7.3	0-0	Low-------	0.10			
	62-81	15-18	1.00-1.10	6.0-20	0.06-0.08	6.1-7.3	0-0	Low-------	0.05			
Medici----------	0-1	---	0.70-0.90	6.0-20	0.37-0.39	5.6-6.5	0-0	Low-------	0.20	5	2	2-8
	1-19	---	0.70-0.90	6.0-20	0.30-0.33	5.6-6.5	0-0	Low-------	0.15			
	19-51	12-18	0.70-0.90	6.0-20	0.05-0.10	6.1-7.3	0-0	Low-------	0.10			
	51-67	12-18	0.70-0.90	2.0-6.0	0.07-0.12	6.1-7.3	0-0	Low-------	0.10			
	67-75	5-12	0.70-0.90	6.0-20	0.06-0.10	6.1-7.3	0-0	Low-------	0.10			
110:												
Boardburn-------	0-9	15-20	1.35-1.50	2.0-6.0	0.12-0.14	6.1-7.3	0-0	Low-------	0.24	4	3	1-4
	9-22	25-27	1.35-1.45	0.6-2.0	0.14-0.16	6.1-7.3	0-0	Low-------	0.32			
	22-40	27-35	1.45-1.50	0.2-0.6	0.13-0.15	6.1-7.3	0-0	Moderate	0.32			
	40-50	27-35	1.45-1.50	0.2-0.6	0.07-0.10	6.1-7.3	0-0	Moderate	0.17			
	50-54	---	---	---	---	---	---	----------	----			
Hambone---------	0-8	10-18	1.35-1.50	2.0-6.0	0.08-0.10	6.1-7.3	0-0	Low-------	0.20	4	4	1-3
	8-22	20-30	1.35-1.50	0.2-0.6	0.08-0.09	6.1-7.3	0-0	Moderate	0.10			
	22-45	27-35	1.35-1.50	0.2-0.6	0.04-0.07	6.1-7.3	0-0	Low-------	0.10			
	45-49	---	---	---	---	---	---	----------	----			
111, 112---------	0-5	18-25	1.30-1.45	0.6-2.0	0.15-0.18	6.1-7.3	0-0	Low-------	0.28	1	6	1-3
Bollibokka	5-9	27-35	1.30-1.45	0.2-0.6	0.16-0.19	6.1-7.3	0-0	Moderate	0.28			
	9-15	27-35	1.30-1.45	0.2-0.6	0.12-0.16	6.6-7.3	0-0	Moderate	0.24			
	15-19	---	---	---	---	---	---	----------	----			
113--------------	0-5	18-25	1.30-1.45	0.6-2.0	0.15-0.18	6.1-7.3	0-0	Low-------	0.28	1	6	1-3
Bollibokka	5-9	27-35	1.30-1.45	0.2-0.6	0.16-0.19	6.1-7.3	0-0	Moderate	0.28			
	9-15	27-35	1.30-1.45	0.2-0.6	0.12-0.16	6.6-7.3	0-0	Moderate	0.24			
	15-19	---	---	---	---	---	---	----------	----			
114--------------	0-3	27-30	0.85-1.00	0.2-0.6	0.45-0.54	5.6-6.5	0-0	Moderate	0.32	2	2	3-7
Britton	3-17	30-40	0.85-1.00	0.2-0.6	0.38-0.45	5.1-6.0	0-0	Moderate	0.28			
	17-21	---	---	---	---	---	---	----------	----			
115--------------	0-3	27-30	0.85-1.00	0.2-0.6	0.45-0.54	5.6-6.5	0-0	Moderate	0.32	2	2	3-7
Britton	3-8	30-40	0.85-1.00	0.2-0.6	0.38-0.45	5.1-6.0	0-0	Moderate	0.28			
	8-15	35-45	0.85-1.00	0.2-0.6	0.31-0.38	5.1-6.0	0-0	Moderate	0.17			
	15-19	---	---	---	---	---	---	----------	----			
116--------------	0-3	27-30	0.85-1.00	0.2-0.6	0.45-0.54	5.6-6.5	0-0	Moderate	0.32	2	2	3-7
Britton	3-8	30-40	0.85-1.00	0.2-0.6	0.38-0.45	5.1-6.0	0-0	Moderate	0.28			
	8-15	35-45	0.85-1.00	0.2-0.6	0.31-0.38	5.1-6.0	0-0	Moderate	0.17			
	15-19	---	---	---	---	---	---	----------	----			
117, 118, 119:												
Bundora---------	0-14	---	0.60-1.00	2.0-6.0	0.42-0.45	6.1-7.3	0-0	Low-------	0.17	4	8	2-14
	14-29	---	0.90-1.15	6.0-20	0.37-0.43	6.6-7.3	0-0	Low-------	0.17			
	29-63	15-25	0.90-1.15	0.2-0.6	0.11-0.15	5.1-6.0	0-0	Low-------	0.20			
Goulder---------	0-7	9-12	0.65-0.85	2.0-6.0	0.32-0.36	6.1-7.3	0-0	Low-------	0.10	5	8	2-4
	7-17	12-20	0.65-0.85	2.0-6.0	0.30-0.34	6.1-7.3	0-0	Low-------	0.10			
	17-27	12-20	1.00-1.20	0.6-2.0	0.11-0.14	6.1-7.3	0-0	Low-------	0.20			
	27-41	27-35	1.15-1.25	0.2-0.6	0.08-0.12	5.1-6.0	0-0	Low-------	0.10			
	41-58	27-35	1.25-1.35	0.2-0.6	0.05-0.13	5.1-6.0	0-0	Low-------	0.10			
	58-64	27-35	1.25-1.35	0.2-0.6	0.09-0.13	5.1-6.0	0-0	Low-------	0.05			

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
120-------------- Bunselmeier	0-12	10-20	1.00-1.20	2.0-6.0	0.06-0.09	6.6-7.8	0-0	Low-------	0.10	4	5	2-5
	12-25	20-30	0.90-1.00	0.2-0.6	0.08-0.10	6.6-7.8	0-0	Low-------	0.10			
	25-48	10-20	1.20-1.40	2.0-6.0	0.04-0.06	6.6-7.3	0-0	Low-------	0.10			
	48-62	---	---	---	---	---	0-0	----------	----			
121:												
Burman----------	0-3	20-27	1.00-1.20	0.6-2.0	0.14-0.17	6.6-7.3	0-0	Low-------	0.37	2	6	1-2
	3-7	27-30	1.00-1.20	0.2-0.6	0.17-0.19	6.6-7.3	0-0	Moderate	0.28			
	7-11	30-35	1.00-1.20	0.2-0.6	0.17-0.19	6.6-7.3	0-0	Moderate	0.28			
	11-29	45-60	1.00-1.20	0.06-0.2	0.15-0.17	6.6-7.8	0-0	High------	0.15			
	29-72	---	---	---	---	6.6-7.8	---	----------	----			
Lasvar----------	0-3	45-55	1.00-1.20	0.06-0.2	0.15-0.17	6.6-7.3	0-0	High------	0.20	2	7	1-2
	3-28	45-55	1.00-1.20	0.06-0.2	0.15-0.17	6.6-7.8	0-0	High------	0.20			
	28-31	25-35	1.00-1.20	0.2-2.0	0.17-0.20	7.9-8.4	0-0	Moderate	0.43			
	31-60	---	---	---	---	8.5-9.0	0-0	----------	----			
122:												
Burney----------	0-8	18-25	1.35-1.40	0.6-2.0	0.12-0.15	5.6-6.5	0-0	Low-------	0.20	4	7	2-7
	8-38	25-35	1.40-1.45	0.6-2.0	0.10-0.14	5.1-6.5	0-0	Low-------	0.24			
	38-59	27-40	1.70-1.80	0.2-0.6	0.08-0.10	5.1-6.5	0-0	Low-------	0.15			
	59-63	---	---	---	---	---	---	----------	----			
Arkright--------	0-10	18-25	1.30-1.40	0.6-2.0	0.12-0.15	5.6-6.5	0-0	Low-------	0.20	3	7	2-6
	10-14	25-35	1.40-1.50	0.2-0.6	0.10-0.14	6.1-7.3	0-0	Low-------	0.24			
	14-24	25-35	1.40-1.60	0.2-0.6	0.10-0.14	6.1-7.3	0-0	Low-------	0.24			
	24-28	---	---	---	---	---	---	----------	----			
123:												
Canyoncreek-----	0-19	---	0.70-0.85	2.0-6.0	0.42-0.45	5.6-6.5	0-0	Low-------	0.24	3	3	5-9
	19-43	---	0.85-1.20	0.6-2.0	0.15-0.25	5.6-6.5	0-0	Low-------	0.10			
	43-58	18-27	1.00-1.20	0.6-2.0	0.04-0.07	5.6-6.5	0-0	Low-------	0.10			
	58-68	---	---	---	---	---	---	----------	----			
Hermit----------	0-17	---	0.70-0.85	2.0-6.0	0.40-0.43	5.6-6.5	0-0	Low-------	0.24	4	2	2-4
	17-28	---	1.00-1.20	2.0-6.0	0.42-0.44	5.6-6.5	0-0	Low-------	0.24			
	28-40	18-27	1.00-1.20	0.6-2.0	0.12-0.17	5.6-6.5	0-0	Low-------	0.10			
	40-44	---	---	---	---	---	---	----------	----			
124:												
Canyoncreek-----	0-14	---	0.70-0.85	2.0-6.0	0.42-0.45	5.6-6.5	0-0	Low-------	0.24	3	3	5-9
	14-36	---	0.85-1.20	0.6-2.0	0.15-0.25	5.6-6.5	0-0	Low-------	0.10			
	36-55	18-27	1.00-1.20	0.6-2.0	0.04-0.07	5.6-6.5	0-0	Low-------	0.10			
	55-59	---	---	---	---	---	---	----------	----			
Hermit----------	0-17	---	0.70-0.85	2.0-6.0	0.40-0.43	5.6-6.5	0-0	Low-------	0.24	4	2	2-4
	17-28	---	1.00-1.20	2.0-6.0	0.42-0.44	5.6-6.5	0-0	Low-------	0.24			
	28-40	18-27	1.00-1.20	0.6-2.0	0.12-0.17	5.6-6.5	0-0	Low-------	0.10			
	40-44	---	---	---	---	---	---	----------	----			
125, 126, 127---- Carberry	0-5	---	0.50-0.70	2.0-6.0	0.40-0.45	5.6-6.5	0-0	Low-------	0.15	3	3	5-8
	5-12	---	0.80-0.90	2.0-6.0	0.38-0.43	5.6-6.5	0-0	Low-------	0.15			
	12-17	---	0.80-0.90	2.0-6.0	0.30-0.36	5.6-6.5	0-0	Low-------	0.10			
	17-50	---	1.00-1.10	2.0-6.0	0.08-0.10	5.6-6.5	0-0	Low-------	0.05			
	50-54	---	---	---	---	---	---	----------	----			
128, 129:												
Carberry--------	0-9	---	0.50-0.70	2.0-6.0	0.40-0.45	5.6-6.5	0-0	Low-------	0.15	3	3	5-8
	9-19	---	0.80-0.90	2.0-6.0	0.30-0.36	5.6-6.5	0-0	Low-------	0.10			
	19-60	---	1.00-1.10	2.0-6.0	0.08-0.10	5.6-6.5	0-0	Low-------	0.05			
	60-64	---	---	---	---	---	---	----------	----			

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
128, 129:												
Ponto-----------	0-6	---	0.50-0.90	2.0-6.0	0.43-0.45	5.6-7.3	0-0	Low-------	0.17	5	2	5-12
	6-80	---	0.50-0.90	2.0-6.0	0.45-0.50	6.1-7.3	0-0	Low-------	0.20			
130:												
Carberry--------	0-9	---	0.50-0.70	2.0-6.0	0.40-0.45	5.6-6.5	0-0	Low-------	0.15	3	3	5-8
	9-19	---	0.80-0.90	2.0-6.0	0.30-0.36	5.6-6.5	0-0	Low-------	0.10			
	19-60	---	1.00-1.10	2.0-6.0	0.08-0.10	5.6-6.5	0-0	Low-------	0.05			
	60-64	---	---	---	---	---	---	----------	----			
Lava flows------	0-60	0-0	---	---	---	---	0-0	----------	----	---	---	---
131-------------- Chalkford	0-9	25-27	1.30-1.50	0.6-2.0	0.16-0.18	6.6-7.8	0-0	Low-------	0.43	5	6	2-4
	9-35	27-35	1.30-1.45	0.2-0.6	0.18-0.20	6.6-7.8	0-0	Low-------	0.32			
	35-62	35-45	1.30-1.50	0.2-0.6	0.16-0.20	6.6-7.8	0-0	Moderate	0.32			
132:												
Chatterdown-----	0-15	---	0.80-0.95	2.0-6.0	0.47-0.50	6.1-7.3	0-0	Low-------	0.20	5	2	8-12
	15-30	3-5	0.85-0.95	2.0-6.0	0.35-0.43	6.1-7.3	0-0	Low-------	0.15			
	30-47	3-5	0.95-1.05	2.0-6.0	0.32-0.40	6.1-7.3	0-0	Low-------	0.15			
	47-63	3-5	1.10-1.20	2.0-6.0	0.30-0.35	6.1-7.3	0-0	Low-------	0.15			
	63-67	---	---	---	---	---	---	----------	----			
Nikal-----------	0-10	---	0.80-0.90	2.0-6.0	0.38-0.43	5.6-6.5	0-0	Low-------	0.15	2	3	2-8
	10-36	---	0.85-1.20	2.0-6.0	0.28-0.32	5.6-6.5	0-0	Low-------	0.10			
	36-40	---	---	---	---	---	---	----------	----			
133:												
Chirpchatter----	0-7	10-18	1.35-1.50	2.0-6.0	0.10-0.12	6.1-7.3	0-0	Low-------	0.24	5	3	1-3
	7-32	20-27	1.40-1.50	0.6-2.0	0.13-0.15	6.1-7.3	0-0	Moderate	0.24			
	32-70	15-20	1.40-1.55	2.0-6.0	0.07-0.09	6.1-7.3	0-0	Low-------	0.15			
Hunsinger-------	0-13	10-15	1.35-1.55	2.0-6.0	0.08-0.11	6.1-7.3	0-0	Low-------	0.20	4	4	2-5
	13-26	20-27	1.35-1.50	0.2-0.6	0.03-0.09	6.1-7.3	0-0	Moderate	0.10			
	26-42	20-27	1.40-1.55	0.2-0.6	0.06-0.10	6.1-7.3	0-0	Moderate	0.15			
	42-46	---	---	---	---	---	---	----------	----			
134-------------- Coneward	0-8	3-5	1.60-1.70	6.0-20	0.06-0.08	6.1-7.3	0-0	Low-------	0.20	4	2	.5-1
	8-55	3-5	1.60-1.70	6.0-20	0.06-0.08	6.1-7.3	0-0	Low-------	0.20			
	55-60	3-5	1.60-1.70	6.0-20	0.04-0.06	6.1-7.3	0-0	Low-------	0.20			
135, 136--------- Coneward	0-8	3-5	1.60-1.70	6.0-20	0.06-0.08	6.1-7.3	0-0	Low-------	0.20	4	2	.5-1
	8-50	3-5	1.60-1.70	6.0-20	0.06-0.08	6.1-7.3	0-0	Low-------	0.20			
	50-60	3-5	1.60-1.70	6.0-20	0.04-0.06	6.1-7.3	0-0	Low-------	0.20			
137:												
Coneward--------	0-8	3-5	1.60-1.70	6.0-20	0.06-0.08	6.1-7.3	0-0	Low-------	0.20	4	2	.5-1
	8-50	3-5	1.60-1.70	6.0-20	0.06-0.08	6.1-7.3	0-0	Low-------	0.20			
	50-60	3-5	1.60-1.70	6.0-20	0.05-0.07	6.1-7.3	0-0	Low-------	0.15			
Lava flows------	0-60	0-0	---	---	---	---	0-0	----------	----	---	---	---
138-------------- Cupvar	0-21	40-60	1.20-1.30	0.06-0.2	0.14-0.16	6.6-7.8	0-2	High------	0.32	3	7	2-4
	21-25	---	---	---	---	---	---	Low-------	----			
	25-64	10-25	1.35-1.60	2.0-6.0	0.12-0.14	7.4-8.4	0-2	Low-------	0.28			

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
139, 140, 141----Danhunt	0-2	---	0.50-0.65	2.0-6.0	0.35-0.40	5.6-6.5	0-0	Low--------	0.10	3	3	5-10
	2-11	---	0.50-0.75	2.0-6.0	0.25-0.30	5.6-6.5	0-0	Low--------	0.10			
	11-22	---	0.80-0.85	2.0-6.0	0.20-0.25	5.6-6.5	0-0	Low--------	0.05			
	22-38	---	0.80-0.85	6.0-20	0.17-0.20	5.6-6.5	0-0	Low--------	0.05			
	38-61	---	0.80-0.85	6.0-20	0.12-0.15	5.1-6.5	0-0	Low--------	0.02			
	61-65	---	---	---	---	---	---	-----------	----			
142-------------Daphnedale	0-3	18-27	1.35-1.50	0.6-2.0	0.14-0.16	6.6-7.8	0-2	Low--------	0.32	3	6	1-2
	3-25	35-45	1.30-1.45	0.06-0.2	0.15-0.18	6.6-7.8	0-2	High-------	0.32			
	25-36	20-35	1.40-1.55	0.2-0.6	0.13-0.18	7.4-8.4	0-2	Moderate	0.32			
	36-40	---	---	---	---	---	---	-----------	----			
143-------------Datom	0-3	27-35	0.70-0.75	0.2-0.6	0.23-0.25	6.6-7.3	0-0	Moderate	0.32	2	2	4-9
	3-12	35-40	0.80-0.95	0.06-0.2	0.25-0.27	6.6-7.3	0-0	Moderate	0.37			
	12-16	40-50	0.75-0.80	0.06-0.2	0.26-0.28	6.6-7.3	0-0	Moderate	0.37			
	16-20	---	---	---	---	---	---	-----------	----			
144-------------Dekkas	0-3	---	0.50-0.70	2.0-6.0	0.47-0.50	5.6-6.5	0-0	Low--------	0.20	5	2	8-12
	3-34	---	0.95-1.10	>20	0.25-0.27	6.1-6.5	0-0	Low--------	0.15			
	34-43	---	1.00-1.20	>20	0.08-0.10	6.1-6.5	0-0	Low--------	0.15			
	43-54	3-10	1.00-1.20	>20	0.06-0.07	6.1-6.5	0-0	Low--------	0.10			
	54-64	3-10	1.00-1.20	>20	0.02-0.05	6.1-6.5	0-0	Low--------	0.10			
	64-80	27-35	1.00-1.20	0.2-0.6	0.06-0.10	5.6-6.5	0-0	Low--------	0.10			
145, 146---------Depner	0-16	---	0.50-0.90	2.0-6.0	0.39-0.42	5.6-6.5	0-0	Low--------	0.15	4	3	10-15
	16-48	---	0.70-1.00	2.0-6.0	0.30-0.33	5.1-6.5	0-0	Low--------	0.10			
	48-52	---	---	---	---	---	---	-----------	----			
147, 148, 149----Deven	0-4	20-27	1.35-1.50	0.6-2.0	0.08-0.10	6.1-7.8	0-2	Low--------	0.15	1	8	1-3
	4-15	35-50	1.30-1.40	0.06-0.2	0.13-0.17	6.1-7.8	0-2	High-------	0.28			
	15-19	---	---	---	---	---	---	-----------	----			
150:												
Dosa------------	0-4	35-40	1.50-1.60	0.2-0.6	0.17-0.20	6.1-6.5	0-0	High-------	0.37	3	4	2-3
	4-28	45-55	1.35-1.55	0.06-0.2	0.08-0.17	6.1-7.8	0-0	High-------	0.24			
	28-32	---	---	---	---	---	---	-----------	----			
Burman----------	0-8	20-27	1.40-1.50	0.6-2.0	0.15-0.17	6.6-7.3	0-0	Low--------	0.37	2	6	.5-1
	8-33	35-40	1.35-1.45	0.06-0.2	0.17-0.19	6.6-7.3	0-0	Moderate	0.32			
	33-39	---	---	---	---	---	0-0	-----------	----			
	39-72	15-20	1.50-1.60	2.0-6.0	0.12-0.15	6.6-8.4	0-2	Low--------	0.24			
151-------------Dotta	0-13	18-27	1.35-1.50	0.6-2.0	0.13-0.16	6.1-7.3	0-0	Low--------	0.37	5	6	1-3
	13-41	20-27	1.40-1.50	0.2-0.6	0.13-0.15	6.6-7.3	0-0	Moderate	0.24			
	41-68	20-27	1.40-1.50	0.2-0.6	0.08-0.13	6.6-7.3	0-0	Moderate	0.20			
152-------------Dotta	0-16	10-20	1.40-1.50	0.6-2.0	0.11-0.13	6.1-7.3	0-0	Low--------	0.28	5	3	1-3
	16-47	20-27	1.35-1.50	0.2-0.6	0.14-0.17	5.6-7.3	0-0	Moderate	0.24			
	47-75	5-15	1.45-1.60	2.0-6.0	0.09-0.11	5.6-7.3	0-0	Low--------	0.20			
153, 154, 155----Dotta	0-17	10-20	1.40-1.50	0.6-2.0	0.11-0.13	6.1-7.3	0-0	Low--------	0.28	5	3	1-3
	17-29	20-27	1.35-1.50	0.2-0.6	0.14-0.17	5.6-7.3	0-0	Moderate	0.24			
	29-72	5-15	1.45-1.60	2.0-6.0	0.09-0.11	5.6-7.3	0-0	Low--------	0.20			
156:												
Dotta-----------	0-16	10-20	1.40-1.50	0.6-2.0	0.11-0.13	6.1-7.3	0-0	Low--------	0.28	5	3	1-3
	16-47	20-27	1.35-1.50	0.2-0.6	0.14-0.17	5.6-7.3	0-0	Moderate	0.24			
	47-75	5-15	1.45-1.60	2.0-6.0	0.09-0.11	5.6-7.3	0-0	Low--------	0.20			

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
156:												
Esperanza-------	0-5	18-27	1.10-1.20	0.6-2.0	0.16-0.19	6.1-7.8	0-0	Low-------	0.24	4	6	2-5
	5-53	35-50	1.40-1.60	0.06-0.2	0.15-0.18	6.6-7.8	0-0	High------	0.20			
	53-58	5-15	1.30-1.40	0.6-2.0	0.10-0.12	6.6-7.8	0-2	Low-------	0.17			
	58-61	---	---	---	---	---	---	----------	----			
157:												
Dotta-----------	0-16	10-20	1.40-1.50	0.6-2.0	0.11-0.13	6.1-7.3	0-0	Low-------	0.28	5	3	1-3
	16-47	20-27	1.35-1.50	0.2-0.6	0.14-0.17	5.6-7.3	0-0	Moderate	0.24			
	47-75	5-15	1.45-1.60	2.0-6.0	0.09-0.11	5.6-7.3	0-0	Low-------	0.20			
Ricketts--------	0-10	15-20	1.35-1.50	0.6-2.0	0.07-0.10	6.1-7.3	0-0	Low-------	0.10	2	7	1-2
	10-26	25-30	1.35-1.50	0.2-0.6	0.07-0.11	6.1-7.3	0-0	Low-------	0.15			
	26-36	---	---	---	---	---	---	----------	----			
158:												
Dotta-----------	0-12	10-25	1.35-1.50	0.6-2.0	0.07-0.12	6.1-7.3	0-0	Low-------	0.20	5	6	1-3
	12-54	20-27	1.35-1.50	0.2-0.6	0.08-0.13	5.6-7.3	0-0	Moderate	0.20			
	54-64	5-15	1.45-1.60	2.0-6.0	0.06-0.09	5.6-7.3	0-0	Low-------	0.17			
Searvar---------	0-6	10-15	1.25-1.35	2.0-6.0	0.13-0.15	6.1-7.3	0-0	Low-------	0.20	3	6	2-6
	6-18	12-18	1.25-1.35	0.6-2.0	0.08-0.11	6.6-7.3	0-0	Low-------	0.10			
	18-28	18-25	1.25-1.35	0.6-2.0	0.08-0.11	6.6-7.3	0-0	Low-------	0.10			
	28-53	---	---	---	---	---	---	----------	----			
	53-63	---	---	---	---	---	---	----------	----			
159:												
Dudgen----------	0-4	20-27	1.40-1.50	0.6-2.0	0.15-0.17	6.6-7.3	0-0	Low-------	0.37	1	6	.5-1
	4-8	27-35	1.35-1.45	0.2-0.6	0.17-0.19	6.6-7.3	0-0	Moderate	0.32			
	8-15	40-60	1.35-1.45	0.06-0.2	0.14-0.16	6.6-7.8	0-2	High------	0.28			
	15-19	---	---	---	---	---	0-0	----------	----			
	19-37	15-20	1.50-1.60	2.0-6.0	0.12-0.15	6.6-8.4	0-2	Low-------	0.24			
	37-99	10-15	1.55-1.70	6.0-20	0.06-0.10	6.6-8.4	0-2	Low-------	0.20			
Graven----------	0-9	15-25	1.40-1.50	0.6-2.0	0.16-0.18	6.6-7.3	0-0	Low-------	0.43	2	6	1-2
	9-14	25-30	1.40-1.50	0.2-0.6	0.16-0.18	6.6-7.3	0-0	Moderate	0.37			
	14-23	35-50	1.35-1.50	0.06-0.2	0.14-0.16	6.6-7.8	0-2	High------	0.24			
	23-29	0-0	---	---	---	---	---	----------	----			
	29-35	5-20	1.45-1.55	0.2-0.6	0.12-0.16	7.4-9.0	0-2	Low-------	0.32			
	35-64	5-15	1.50-1.65	2.0-20	0.10-0.16	7.4-9.0	0-2	Low-------	0.32			
160:												
Dudgen----------	0-5	20-27	1.40-1.50	0.6-2.0	0.15-0.17	6.6-7.3	0-0	Low-------	0.37	1	6	.5-1
	5-11	27-35	1.35-1.45	0.2-0.6	0.17-0.19	6.6-7.3	0-0	Moderate	0.32			
	11-16	40-60	1.35-1.45	0.06-0.2	0.14-0.16	6.6-7.8	0-2	High------	0.28			
	16-19	---	---	---	---	---	0-0	----------	----			
	19-60	10-15	1.55-1.70	6.0-20	0.06-0.10	6.6-8.4	0-2	Low-------	0.32			
Graven----------	0-2	15-25	1.40-1.50	0.6-2.0	0.16-0.18	6.6-7.3	0-0	Low-------	0.43	2	6	1-2
	2-12	25-30	1.40-1.50	0.2-0.6	0.16-0.18	6.6-7.3	0-0	Moderate	0.37			
	12-20	35-50	1.35-1.50	0.06-0.2	0.14-0.16	6.6-7.8	<2	High------	0.24			
	20-24	---	---	---	---	---	---	----------	----			
	24-60	5-15	1.50-1.65	2.0-20	0.10-0.16	7.9-9.0	<2	Low-------	0.20			
161------------- Esperanza	0-6	15-20	1.10-1.20	2.0-6.0	0.12-0.14	6.1-7.8	0-0	Low-------	0.20	4	3	2-5
	6-30	35-50	1.40-1.60	0.06-0.2	0.15-0.18	6.6-7.8	0-0	High------	0.20			
	30-44	25-35	1.35-1.55	0.2-0.6	0.16-0.19	6.6-7.8	0-0	Moderate	0.20			
	44-58	5-15	1.30-1.40	0.6-2.0	0.10-0.12	6.6-7.8	0-2	Low-------	0.17			
	58-61	---	---	---	---	---	---	----------	----			

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
162-------------- Esperanza	0-5	18-27	1.10-1.20	0.6-2.0	0.16-0.19	6.1-7.8	0-0	Low-------	0.24	4	6	2-5
	5-30	35-50	1.40-1.60	0.06-0.2	0.15-0.18	6.6-7.8	0-0	High------	0.20			
	30-53	25-35	1.35-1.55	0.2-0.6	0.16-0.19	6.6-7.8	0-0	Moderate	0.20			
	53-58	5-15	1.30-1.40	0.6-2.0	0.10-0.12	6.6-7.8	0-2	Low-------	0.17			
	58-60	---	---	---	---	---	---	----------	----			
163-------------- Esro	0-22	18-27	1.00-1.20	0.6-2.0	0.18-0.20	6.1-7.3	0-0	Low-------	0.43	4	6	2-6
	22-40	27-30	1.00-1.20	0.2-0.6	0.17-0.19	6.1-7.3	<2	Low-------	0.37			
	40-43	20-30	1.00-1.20	0.2-0.6	0.13-0.16	6.6-7.8	<2	Moderate	0.28			
	43-60	20-30	1.00-1.20	0.2-0.6	0.06-0.10	6.6-7.8	<2	Moderate	0.10			
164:												
Etsel-----------	0-2	12-18	1.35-1.50	0.6-2.0	0.04-0.10	5.1-6.5	0-0	Low-------	0.10	1	7	1-2
	2-9	12-18	1.35-1.50	0.6-2.0	0.04-0.10	5.1-6.5	0-0	Low-------	0.10			
	9-13	---	---	---	---	---	---	----------	----			
Neuns-----------	0-7	6-17	1.35-1.50	0.6-2.0	0.08-0.10	5.1-6.5	0-0	Low-------	0.15	2	4	5-11
	7-32	8-18	1.35-1.50	0.6-2.0	0.05-0.08	5.1-6.5	0-0	Low-------	0.10			
	32-36	---	---	---	---	---	---	----------	----			
165, 166:												
Fiddler---------	0-5	18-27	1.35-1.50	0.6-2.0	0.11-0.14	6.1-7.3	0-0	Low-------	0.20	2	8	1-3
	5-31	35-50	1.30-1.50	0.06-0.2	0.07-0.10	6.1-7.3	0-0	Moderate	0.10			
	31-35	---	---	0.00-0.01	---	---	---	----------	----			
Deven-----------	0-4	20-27	1.35-1.50	0.6-2.0	0.08-0.10	6.1-7.8	0-2	Low-------	0.15	1	8	1-3
	4-15	35-50	1.30-1.40	0.06-0.2	0.13-0.17	6.1-7.8	0-2	High------	0.28			
	15-19	---	---	---	---	---	---	----------	----			
167:												
Fiddler---------	0-5	18-27	1.35-1.50	0.6-2.0	0.11-0.14	6.1-7.3	0-0	Low-------	0.20	2	8	1-3
	5-31	35-50	1.30-1.50	0.06-0.2	0.07-0.10	6.1-7.3	0-0	Moderate	0.10			
	31-35	---	---	0.00-0.01	---	---	---	----------	----			
Whitinger-------	0-10	20-25	1.40-1.50	0.6-2.0	0.10-0.14	6.1-7.3	0-0	Low-------	0.20	2	7	1-2
	10-30	20-25	1.40-1.50	0.2-0.6	0.07-0.10	6.1-7.8	0-0	Low-------	0.10			
	30-34	---	---	0.00-0.01	---	---	---	----------	----			
168:												
Fiddler---------	0-5	18-27	1.35-1.50	0.6-2.0	0.11-0.14	6.1-7.3	0-0	Low-------	0.20	2	8	1-3
	5-31	35-50	1.30-1.50	0.06-0.2	0.07-0.10	6.1-7.3	0-0	Moderate	0.10			
	31-35	---	---	0.00-0.01	---	---	---	----------	----			
Whitinger-------	0-10	20-25	1.40-1.50	0.6-2.0	0.10-0.14	6.1-7.3	0-0	Low-------	0.20	2	7	1-2
	10-35	20-25	1.40-1.50	0.2-0.6	0.07-0.10	6.1-7.8	0-0	Low-------	0.10			
	35-39	---	---	0.00-0.01	---	---	---	----------	----			
169:												
Gardens---------	0-3	18-27	1.00-1.20	0.6-2.0	0.16-0.18	6.1-6.5	0-0	Low-------	0.37	3	6	2-3
	3-7	28-35	1.00-1.20	0.2-0.6	0.16-0.21	5.6-6.5	0-0	Moderate	0.20			
	7-15	28-35	1.00-1.20	0.2-0.6	0.12-0.16	5.6-6.5	0-0	Moderate	0.17			
	15-30	18-27	1.00-1.20	0.2-2.0	0.11-0.16	6.6-7.3	0-0	Low-------	0.17			
	30-33	15-18	1.00-1.20	2.0-6.0	0.05-0.09	6.6-7.3	0-0	Low-------	0.15			
	33-62	15-30	1.00-1.20	0.2-6.0	0.13-0.16	6.6-7.3	0-0	Low-------	0.15			
Jacksback-------	0-12	20-25	1.00-1.20	0.6-2.0	0.14-0.17	6.1-6.5	0-0	Low-------	0.28	5	6	1-2
	12-21	25-27	1.00-1.20	0.6-2.0	0.14-0.17	6.1-6.5	0-0	Low-------	0.28			
	21-42	27-30	1.00-1.20	0.2-0.6	0.14-0.17	6.1-6.5	0-0	Moderate	0.15			
	42-52	12-18	1.00-1.20	2.0-6.0	0.11-0.12	6.6-7.3	0-0	Low-------	0.15			
	52-75	12-20	1.00-1.20	2.0-6.0	0.13-0.15	6.6-7.3	0-0	Low-------	0.15			
	75-80	12-20	1.00-1.20	0.6-2.0	0.16-0.19	6.6-7.3	0-0	Low-------	0.37			

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
170, 171:												
Gasper	0-4	---	0.80-0.90	2.0-6.0	0.28-0.30	5.6-6.5	0-0	Low	0.20	3	2	3-6
	4-16	15-20	0.90-1.00	2.0-6.0	0.27-0.29	5.6-6.5	0-0	Low	0.20			
	16-38	15-20	1.00-1.25	2.0-6.0	0.06-0.12	5.6-6.5	0-0	Low	0.10			
	38-60	20-25	1.10-1.30	0.2-0.6	0.11-0.14	5.6-7.3	0-0	Low	0.10			
Scarface	0-16	---	0.90-1.00	2.0-6.0	0.40-0.43	6.1-7.3	0-0	Low	0.15	5	2	2-6
	16-24	---	0.80-0.90	2.0-6.0	0.18-0.20	6.1-7.3	0-0	Low	0.15			
	24-37	---	1.20-1.30	0.2-0.6	0.17-0.19	6.1-7.3	0-0	Low	0.15			
	37-52	---	1.20-1.30	0.2-0.6	0.16-0.18	6.1-7.3	0-0	Low	0.10			
	52-84	---	1.20-1.30	0.2-0.6	0.14-0.18	6.1-7.3	0-0	Moderate	0.10			
172:												
Gasper	0-5	---	0.80-0.90	2.0-6.0	0.28-0.30	5.6-6.5	0-0	Low	0.20	3	2	3-6
	5-44	15-20	1.00-1.25	2.0-6.0	0.06-0.12	5.6-6.5	0-0	Low	0.10			
	44-61	20-25	1.10-1.30	0.2-0.6	0.11-0.14	5.6-7.3	0-0	Low	0.10			
Scarface	0-5	---	0.90-1.00	2.0-6.0	0.40-0.43	6.1-7.3	0-0	Low	0.15	5	2	2-6
	5-30	---	0.80-0.90	2.0-6.0	0.18-0.20	6.1-7.3	0-0	Low	0.15			
	30-45	---	1.20-1.30	0.2-0.6	0.17-0.19	6.1-7.3	0-0	Low	0.15			
	45-61	---	1.20-1.30	0.2-0.6	0.16-0.18	6.1-7.3	0-0	Low	0.10			
173, 174:												
Gasper	0-5	---	0.80-0.90	2.0-6.0	0.28-0.30	5.6-6.5	0-0	Low	0.20	3	2	3-6
	5-44	15-20	1.00-1.25	2.0-6.0	0.06-0.12	5.6-6.5	0-0	Low	0.10			
	44-61	20-25	1.10-1.30	0.2-0.6	0.11-0.14	5.6-7.3	0-0	Low	0.10			
Scarface	0-5	---	0.90-1.00	2.0-6.0	0.40-0.43	6.1-7.3	0-0	Low	0.15	5	2	2-6
	5-30	---	0.80-0.90	2.0-6.0	0.18-0.20	6.1-7.3	0-0	Low	0.15			
	30-45	---	1.20-1.30	0.2-0.6	0.17-0.19	6.1-7.3	0-0	Low	0.15			
	45-61	---	1.20-1.30	0.2-0.6	0.14-0.18	6.1-7.3	0-0	Moderate	0.10			
175 Gooval	0-8	10-25	1.20-1.40	0.6-2.0	0.10-0.14	5.6-6.5	0-0	Low	0.20	3	6	2-6
	8-14	27-35	1.15-1.35	0.2-0.6	0.09-0.13	5.6-7.3	0-0	Moderate	0.10			
	14-23	40-55	1.10-1.25	0.06-0.2	0.08-0.10	5.6-7.3	0-0	High	0.10			
	23-27	---	---	---	---	---	---	----------	----			
176 Gosch	0-4	12-15	0.80-0.95	2.0-6.0	0.24-0.28	5.6-6.5	0-0	Low	0.10	4	4	4-6
	4-8	15-18	0.80-0.85	2.0-6.0	0.03-0.07	5.6-6.5	0-0	Low	0.10			
	8-20	20-35	1.00-1.20	0.2-0.6	0.09-0.14	5.6-6.5	0-0	Moderate	0.10			
	20-42	27-35	1.10-1.20	0.2-0.6	0.04-0.08	5.6-6.5	0-0	Moderate	0.05			
	42-46	---	---	---	---	---	---	----------	----			
177:												
Gosch	0-3	---	0.80-0.95	2.0-6.0	0.36-0.38	5.6-6.5	0-0	Low	0.20	4	3	4-6
	3-9	---	0.80-0.85	2.0-6.0	0.03-0.07	5.6-6.5	0-0	Low	0.05			
	9-32	20-35	1.00-1.20	0.2-0.6	0.04-0.11	5.6-6.5	0-0	Low	0.05			
	32-50	27-35	1.10-1.20	0.2-0.6	0.10-0.11	5.6-6.5	0-0	Low	0.05			
	50-54	---	---	---	---	---	---	----------	----			
Witcher	0-4	---	0.70-0.90	2.0-6.0	0.40-0.43	5.6-6.5	0-0	Low	0.24	4	3	2-9
	4-36	20-35	1.00-1.30	0.2-0.6	0.16-0.19	5.6-6.5	0-0	Low	0.28			
	36-47	27-35	1.25-1.35	0.2-0.6	0.08-0.11	5.6-6.5	0-0	Low	0.10			
	47-57	---	---	---	---	---	---	----------	----			
178, 179, 180 Goulder	0-7	9-12	0.65-0.85	2.0-6.0	0.32-0.36	6.1-7.3	0-0	Low	0.10	5	8	2-4
	7-17	12-20	0.65-0.85	2.0-6.0	0.30-0.34	6.1-7.3	0-0	Low	0.10			
	17-27	12-20	1.00-1.20	0.6-2.0	0.11-0.14	6.1-7.3	0-0	Low	0.20			
	27-41	27-35	1.15-1.25	0.2-0.6	0.08-0.12	5.1-6.0	0-0	Low	0.10			
	41-58	27-35	1.25-1.35	0.2-0.6	0.05-0.13	5.1-6.0	0-0	Low	0.10			
	58-64	27-35	1.25-1.35	0.2-0.6	0.09-0.13	5.1-6.0	0-0	Low	0.05			

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
181:												
Gullied land	0-60	---	---	---	---	---	0-0	----------	----	---	---	---
Rock outcrop	0-60	0-0	---	---	0.0-0.0	---	0-0	----------	----	---	---	0-0
Mounthat	0-10	8-18	0.40-0.60	6.0-20	0.50-0.53	5.6-6.5	0-0	Low	0.10	3	3	25-50
	10-21	10-20	0.40-0.70	2.0-6.0	0.33-0.35	5.6-6.5	0-0	Low	0.10			
	21-27	10-20	0.50-0.80	2.0-6.0	0.26-0.31	5.6-6.5	0-0	Low	0.10			
	27-37	---	---	---	---	---	---	----------	----			
182:												
Hambone	0-8	10-18	1.35-1.50	2.0-6.0	0.08-0.10	6.1-7.3	0-0	Low	0.20	4	4	1-3
	8-22	20-30	1.35-1.50	0.2-0.6	0.08-0.09	6.1-7.3	0-0	Moderate	0.10			
	22-45	27-35	1.35-1.50	0.2-0.6	0.04-0.07	6.1-7.3	0-0	Low	0.10			
	45-49	---	---	---	---	---	---	----------	----			
Boardburn	0-9	15-20	1.35-1.50	2.0-6.0	0.12-0.14	6.1-7.3	0-0	Low	0.24	4	3	1-4
	9-22	25-27	1.35-1.45	0.6-2.0	0.14-0.16	6.1-7.3	0-0	Low	0.32			
	22-40	27-35	1.45-1.50	0.2-0.6	0.13-0.15	6.1-7.3	0-0	Moderate	0.32			
	40-50	27-35	1.45-1.50	0.2-0.6	0.07-0.10	6.1-7.3	0-0	Moderate	0.17			
	50-54	---	---	---	---	---	---	----------	----			
183:												
Hambone	0-8	10-18	1.35-1.50	2.0-6.0	0.08-0.10	6.1-7.3	0-0	Low	0.20	4	4	1-3
	8-22	20-30	1.35-1.50	0.2-0.6	0.08-0.09	6.1-7.3	0-0	Moderate	0.10			
	22-45	27-35	1.35-1.50	0.2-0.6	0.04-0.07	6.1-7.3	0-0	Low	0.10			
	45-49	---	---	---	---	---	---	----------	----			
Boardburn	0-9	15-20	1.35-1.50	2.0-6.0	0.12-0.14	6.1-7.3	0-0	Low	0.24	4	3	1-4
	9-22	25-27	1.35-1.45	0.6-2.0	0.14-0.16	6.1-7.3	0-0	Low	0.32			
	22-40	27-35	1.45-1.50	0.2-0.6	0.13-0.15	6.1-7.3	0-0	Moderate	0.32			
	40-50	27-35	1.45-1.50	0.2-0.6	0.07-0.10	6.1-7.3	0-0	Moderate	0.17			
	50-54	---	---	---	---	---	---	----------	----			
184 Henhill	0-21	18-27	1.35-1.50	0.6-2.0	0.18-0.20	6.6-8.4	0-2	Low	0.32	5	6	4-7
	21-46	27-35	1.35-1.50	0.2-0.6	0.19-0.21	7.9-9.0	0-2	Moderate	0.37			
	46-62	15-27	1.40-1.55	0.6-2.0	0.15-0.18	7.9-8.4	0-2	Low	0.43			
185 Henhill	0-3	18-27	1.35-1.50	0.6-2.0	0.18-0.20	6.6-8.4	0-2	Low	0.32	4	6	4-7
	3-36	27-35	1.35-1.50	0.2-0.6	0.19-0.21	7.9-9.0	0-2	Moderate	0.37			
	36-50	20-27	1.40-1.55	0.2-0.6	0.14-0.16	7.9-8.4	0-2	Moderate	0.28			
	50-72	20-27	1.45-1.55	0.2-0.6	0.06-0.10	7.9-8.4	0-2	Low	0.10			
186:												
Hermit	0-15	---	0.70-0.85	2.0-6.0	0.40-0.43	5.6-6.5	0-0	Low	0.24	4	2	2-4
	15-26	---	1.00-1.20	2.0-6.0	0.42-0.44	5.6-6.5	0-0	Low	0.24			
	26-42	18-27	1.00-1.20	0.6-2.0	0.12-0.17	5.6-6.5	0-0	Low	0.10			
	42-46	---	---	---	---	---	---	----------	----			
Canyoncreek	0-19	---	0.70-0.85	2.0-6.0	0.42-0.45	5.6-6.5	0-0	Low	0.24	3	3	5-9
	19-43	---	0.85-1.20	0.6-2.0	0.15-0.25	5.6-6.5	0-0	Low	0.10			
	43-58	18-27	1.00-1.20	0.6-2.0	0.04-0.07	5.6-6.5	0-0	Low	0.10			
	58-68	---	---	---	---	---	---	----------	----			
187:												
Hunsinger	0-13	10-15	1.35-1.55	2.0-6.0	0.08-0.11	6.1-7.3	0-0	Low	0.20	4	4	2-5
	13-26	20-27	1.35-1.50	0.2-0.6	0.03-0.09	6.1-7.3	0-0	Moderate	0.10			
	26-42	20-27	1.40-1.55	0.2-0.6	0.06-0.10	6.1-7.3	0-0	Moderate	0.15			
	42-46	---	---	---	---	---	---	----------	----			

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
187:												
Chirpchatter----	0-7	10-18	1.35-1.50	2.0-6.0	0.10-0.12	6.1-7.3	0-0	Low-------	0.24	5	3	1-3
	7-32	20-27	1.40-1.50	0.6-2.0	0.13-0.15	6.1-7.3	0-0	Moderate	0.24			
	32-70	15-20	1.40-1.55	2.0-6.0	0.07-0.09	6.1-7.3	0-0	Low-------	0.15			
188:												
Hunsinger-------	0-10	10-15	1.35-1.55	2.0-6.0	0.08-0.11	6.1-7.3	0-0	Low-------	0.20	4	4	2-5
	10-55	20-27	1.35-1.50	0.2-0.6	0.03-0.09	6.1-7.3	0-0	Moderate	0.10			
	55-59	---	---	---	---	---	---	----------	----			
Chirpchatter----	0-15	10-18	1.35-1.50	2.0-6.0	0.10-0.12	6.1-7.3	0-0	Low-------	0.24	5	3	1-3
	15-70	20-27	1.40-1.50	0.6-2.0	0.13-0.15	6.1-7.3	0-0	Moderate	0.24			
189:												
Hunsinger-------	0-9	10-15	1.35-1.55	2.0-6.0	0.08-0.11	6.1-7.3	0-0	Low-------	0.20	4	4	2-5
	9-40	20-27	1.40-1.55	0.2-0.6	0.06-0.10	6.1-7.3	0-0	Moderate	0.15			
	40-44	---	---	---	---	---	---	----------	----			
Chirpchatter----	0-15	10-18	1.35-1.50	2.0-6.0	0.10-0.12	6.1-7.3	0-0	Low-------	0.24	5	3	1-3
	15-70	20-27	1.40-1.50	0.6-2.0	0.13-0.15	6.1-7.3	0-0	Moderate	0.24			
190--------------	0-12	20-25	1.00-1.20	0.6-2.0	0.14-0.17	6.1-6.5	0-0	Low-------	0.28	5	6	1-2
Jacksback	12-21	25-27	1.00-1.20	0.6-2.0	0.14-0.17	6.1-6.5	0-0	Low-------	0.28			
	21-42	27-30	1.00-1.20	0.2-0.6	0.14-0.17	6.1-6.5	0-0	Moderate	0.15			
	42-52	12-18	1.00-1.20	2.0-6.0	0.11-0.12	6.6-7.3	0-0	Low-------	0.15			
	52-75	12-20	1.00-1.20	2.0-6.0	0.13-0.15	6.6-7.3	0-0	Low-------	0.15			
	75-80	12-20	1.00-1.20	0.6-2.0	0.16-0.19	6.6-7.3	0-0	Low-------	0.37			
191--------------	0-20	12-16	1.10-1.20	2.0-6.0	0.07-0.11	5.6-6.5	0-0	Low-------	0.15	5	6	1-5
Jadpor	20-32	12-16	1.20-1.30	0.6-2.0	0.02-0.05	6.6-7.3	0-0	Low-------	0.10			
	32-50	20-32	1.30-1.40	0.2-0.6	0.02-0.07	6.1-7.3	0-0	Low-------	0.10			
	50-64	5-20	1.30-1.40	0.2-0.6	0.02-0.07	6.1-7.3	0-0	Low-------	0.10			
192--------------	0-5	12-16	1.10-1.20	2.0-6.0	0.06-0.10	5.6-6.5	0-0	Low-------	0.10	5	5	1-5
Jadpor	5-12	12-16	1.20-1.30	0.6-2.0	0.02-0.05	6.6-7.3	0-0	Low-------	0.10			
	12-23	20-32	1.30-1.40	0.2-0.6	0.02-0.07	6.1-7.3	0-0	Low-------	0.10			
	23-61	5-20	1.30-1.40	0.2-0.6	0.02-0.07	6.1-7.3	0-0	Low-------	0.10			
193:												
Jahjo-----------	0-2	---	0.80-0.90	2.0-6.0	0.16-0.20	5.6-6.0	0-0	Low-------	0.10	1	8	2-5
	2-6	---	0.80-0.90	2.0-6.0	0.15-0.18	6.1-6.5	0-0	Low-------	0.10			
	6-12	---	0.80-0.90	2.0-6.0	0.11-0.13	6.1-6.5	0-0	Low-------	0.10			
	12-16	---	---	---	---	---	---	----------	----			
Lava flows------	0-60	0-0	---	---	---	---	0-0	----------	----	---	---	---
Loveness--------	0-7	15-20	0.80-0.90	2.0-6.0	0.12-0.16	6.1-7.3	0-0	Low-------	0.20	4	2	2-5
	7-12	18-23	0.80-0.90	0.6-2.0	0.15-0.17	6.1-7.3	0-0	Low-------	0.32			
	12-19	23-30	0.95-1.10	0.2-2.0	0.12-0.14	6.1-7.3	0-0	Low-------	0.17			
	19-35	30-35	0.95-1.10	0.2-0.6	0.13-0.17	6.1-7.3	0-0	Low-------	0.15			
	35-60	27-35	0.95-1.10	0.2-0.6	0.04-0.09	6.1-7.3	0-0	Low-------	0.10			
194:												
Jellico---------	0-5	15-20	1.30-1.50	0.6-2.0	0.09-0.11	6.1-7.3	0-0	Low-------	0.10	2	7	1-3
	5-27	20-27	1.30-1.50	0.6-2.0	0.08-0.10	6.6-7.3	0-0	Low-------	0.10			
	27-33	20-27	1.30-1.50	0.6-2.0	0.05-0.07	6.6-7.3	0-0	Low-------	0.10			
	33-37	---	---	---	---	---	---	----------	----			
Lava flows------	0-60	0-0	---	---	---	---	0-0	----------	----	---	---	---

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
195:												
Jellico---------	0-6	15-20	1.30-1.50	0.6-2.0	0.09-0.11	6.1-7.3	0-0	Low-------	0.10	2	7	1-3
	6-23	20-27	1.30-1.50	0.6-2.0	0.08-0.10	6.6-7.3	0-0	Low-------	0.10			
	23-27	---	---	---	---	---	---	----------	----			
Splawn----------	0-3	18-25	1.35-1.50	0.6-2.0	0.06-0.11	6.6-7.3	0-0	Low-------	0.10	2	8	1-3
	3-10	18-27	1.35-1.50	0.6-2.0	0.06-0.11	6.6-7.3	0-0	Low-------	0.10			
	10-17	35-40	1.30-1.45	0.2-0.6	0.07-0.13	6.6-7.3	0-0	Moderate	0.10			
	17-24	35-50	1.25-1.40	0.06-0.2	0.03-0.08	6.6-7.3	0-0	High------	0.10			
	24-34	---	---	---	---	---	---	----------	----			
196:												
Jellico---------	0-5	15-20	1.30-1.50	0.6-2.0	0.09-0.11	6.1-7.3	0-0	Low-------	0.10	2	7	1-3
	5-27	20-27	1.30-1.50	0.6-2.0	0.08-0.10	6.6-7.3	0-0	Low-------	0.10			
	27-33	20-27	1.30-1.50	0.6-2.0	0.05-0.07	6.6-7.3	0-0	Low-------	0.10			
	33-37	---	---	---	---	---	---	----------	----			
Splawn----------	0-8	18-25	1.35-1.50	0.6-2.0	0.06-0.11	6.6-7.3	0-0	Low-------	0.10	2	8	1-3
	8-15	35-40	1.30-1.45	0.2-0.6	0.07-0.13	6.6-7.3	0-0	Moderate	0.10			
	15-28	35-50	1.25-1.40	0.06-0.2	0.03-0.08	6.6-7.3	0-0	High------	0.10			
	28-32	---	---	---	---	---	---	----------	----			
197-------------- Jellycamp	0-3	10-15	1.35-1.45	0.6-2.0	0.02-0.08	6.6-7.8	0-0	Low-------	0.10	1	8	1-2
	3-9	18-27	1.35-1.45	0.6-2.0	0.14-0.16	6.6-7.8	0-0	Moderate	0.37			
	9-19	40-60	1.35-1.45	0.01-0.06	0.14-0.16	6.6-7.8	0-0	High------	0.24			
	19-30	---	---	---	---	---	---	----------	----			
	30-34	---	---	---	---	---	---	----------	----			
198:												
Jellycamp-------	0-7	20-27	1.35-1.50	0.6-2.0	0.06-0.10	6.6-7.8	0-0	Low-------	0.10	1	8	1-2
	7-19	40-60	1.35-1.45	0.01-0.06	0.14-0.16	6.6-7.8	0-0	High------	0.24			
	19-30	---	---	---	---	---	---	----------	----			
	30-34	---	---	---	---	---	---	----------	----			
Karcal----------	0-15	40-60	1.00-1.10	0.06-0.2	0.10-0.13	6.6-7.3	0-0	High------	0.17	2	8	.5-1
	15-29	40-60	1.10-1.35	0.06-0.2	0.12-0.15	7.4-8.4	0-2	High------	0.28			
	29-33	---	---	---	---	---	---	----------	----			
Longcreek-------	0-2	20-27	1.45-1.55	0.6-2.0	0.07-0.09	6.6-7.3	0-0	Low-------	0.17	1	8	1-4
	2-8	35-40	1.30-1.50	0.06-0.2	0.08-0.10	6.6-7.8	0-0	Low-------	0.17			
	8-13	40-50	1.25-1.45	0.06-0.2	0.07-0.08	6.6-7.8	0-0	Moderate	0.15			
	13-17	---	---	0.00-0.01	---	---	---	----------	----			
199:												
Jellycamp-------	0-7	20-27	1.35-1.50	0.6-2.0	0.06-0.10	6.6-7.8	0-0	Low-------	0.10	1	8	1-2
	7-19	40-60	1.35-1.45	0.01-0.06	0.14-0.16	6.6-7.8	0-0	High------	0.24			
	19-30	---	---	---	---	---	---	----------	----			
	30-34	---	---	---	---	---	---	----------	----			
Karcal----------	0-15	40-60	1.00-1.10	0.06-0.2	0.10-0.13	6.6-7.3	0-0	High------	0.17	2	8	.5-1
	15-29	40-60	1.10-1.35	0.06-0.2	0.12-0.15	7.4-8.4	0-2	High------	0.28			
	29-33	---	---	---	---	---	---	----------	----			
Longcreek-------	0-3	20-27	1.45-1.55	0.6-2.0	0.08-0.10	6.6-7.3	0-0	Low-------	0.15	1	8	1-4
	3-16	35-40	1.30-1.50	0.06-0.2	0.08-0.10	6.6-7.8	0-0	Low-------	0.17			
	16-20	---	---	0.00-0.01	---	---	---	----------	----			

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
200:												
Jellycamp-------	0-3	20-27	1.35-1.50	0.6-2.0	0.06-0.10	6.6-7.8	0-0	Low-------	0.10	1	8	1-2
	3-18	40-60	1.35-1.45	0.01-0.06	0.14-0.16	6.6-7.8	0-0	High------	0.24			
	18-38	---	---	---	---	---	---	----------	----			
	38-42	---	---	---	---	---	---	----------	----			
Lassen----------	0-3	40-60	1.20-1.35	0.06-0.2	0.09-0.13	6.6-7.8	0-0	High------	0.20	2	8	1-2
	3-28	35-60	1.20-1.35	0.06-0.2	0.14-0.16	6.6-8.4	0-2	High------	0.28			
	28-32	---	---	---	---	---	---	----------	----			
Longcreek-------	0-3	20-27	1.45-1.55	0.6-2.0	0.07-0.09	6.6-7.3	0-0	Low-------	0.17	1	8	1-4
	3-16	35-40	1.30-1.50	0.06-0.2	0.08-0.10	6.6-7.8	0-0	Low-------	0.17			
	16-20	---	---	0.00-0.01	---	---	---	----------	----			
201:												
Jellycamp-------	0-3	20-27	1.35-1.50	0.6-2.0	0.06-0.10	6.6-7.8	0-0	Low-------	0.10	1	8	1-2
	3-6	20-27	1.40-1.50	0.6-2.0	0.14-0.16	6.6-7.8	0-0	Moderate	0.37			
	6-11	40-60	1.35-1.45	0.01-0.06	0.14-0.16	6.6-7.8	0-0	High------	0.24			
	11-16	---	---	---	---	---	---	----------	----			
	16-20	---	---	---	---	---	---	----------	----			
Ollierivas------	0-5	18-25	1.35-1.50	0.6-2.0	0.14-0.16	6.6-7.3	0-0	Low-------	0.37	3	6	1-2
	5-23	35-50	1.30-1.40	0.06-0.2	0.14-0.16	6.6-7.3	0-0	High------	0.24			
	23-31	40-50	---	---	---	---	---	----------	----			
	31-34	---	---	---	---	---	---	----------	----			
202:												
Jellycamp-------	0-3	20-27	1.35-1.50	0.6-2.0	0.06-0.10	6.6-7.8	0-0	Low-------	0.10	1	8	1-2
	3-6	20-27	1.40-1.50	0.6-2.0	0.14-0.16	6.6-7.8	0-0	Moderate	0.37			
	6-11	40-60	1.35-1.45	0.01-0.06	0.14-0.16	6.6-7.8	0-0	High------	0.24			
	11-31	---	---	---	---	---	---	----------	----			
	31-35	---	---	---	---	---	---	----------	----			
Splawn----------	0-8	18-25	1.35-1.50	0.6-2.0	0.06-0.11	6.6-7.3	0-0	Low-------	0.10	2	8	1-3
	8-15	35-40	1.30-1.45	0.2-0.6	0.07-0.13	6.6-7.3	0-0	Moderate	0.10			
	15-28	35-50	1.25-1.40	0.06-0.2	0.03-0.08	6.6-7.3	0-0	High------	0.10			
	28-32	---	---	---	---	---	---	----------	----			
Ollierivas------	0-5	18-25	1.35-1.50	0.6-2.0	0.14-0.16	6.6-7.3	0-0	Low-------	0.37	3	6	1-2
	5-23	35-50	1.30-1.40	0.06-0.2	0.14-0.16	6.6-7.3	0-0	High------	0.24			
	23-31	40-50	---	---	---	---	---	----------	----			
	31-34	---	---	---	---	---	---	----------	----			
203:												
Jellycamp-------	0-5	18-27	1.40-1.50	0.6-2.0	0.16-0.18	6.6-7.8	0-0	Low-------	0.37	1	5	1-2
	5-12	40-60	1.35-1.45	0.00-0.06	0.14-0.16	6.6-7.8	0-0	High------	0.24			
	12-19	---	---	---	---	---	---	----------	----			
	19-23	---	---	---	---	---	---	----------	----			
Splawn----------	0-10	18-25	1.35-1.50	0.6-2.0	0.06-0.11	6.6-7.3	0-0	Low-------	0.10	2	8	1-3
	10-17	35-40	1.30-1.45	0.2-0.6	0.07-0.13	6.6-7.3	0-0	Moderate	0.10			
	17-27	35-50	1.25-1.40	0.06-0.2	0.03-0.08	6.6-7.3	0-0	High------	0.10			
	27-31	---	---	---	---	---	---	----------	----			
Ricketts--------	0-10	15-20	1.35-1.50	0.6-2.0	0.07-0.10	6.1-7.3	0-0	Low-------	0.10	2	7	1-2
	10-26	25-30	1.35-1.50	0.2-0.6	0.07-0.11	6.1-7.3	0-0	Low-------	0.15			
	26-36	---	---	---	---	---	---	----------	----			

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
204:												
Jellycamp-------	0-11	20-27	1.35-1.50	0.6-2.0	0.06-0.10	6.6-7.8	0-0	Low-------	0.10	1	8	1-2
	11-20	40-60	1.35-1.45	0.01-0.06	0.14-0.16	6.6-7.8	0-0	High------	0.24			
	20-35	---	---	---	---	---	---	----------	----			
	35-39	---	---	---	---	---	---	----------	----			
Vansickle-------	0-10	15-18	1.35-1.50	0.6-2.0	0.07-0.09	6.1-7.3	0-0	Low-------	0.15	2	7	1-2
	10-16	40-60	1.25-1.40	0.06-0.2	0.08-0.10	6.1-7.3	0-0	Moderate	0.10			
	16-18	---	---	---	---	---	---	----------	----			
	18-22	---	---	---	---	---	---	----------	----			
205:												
Jellycamp-------	0-5	20-27	1.35-1.50	0.6-2.0	0.02-0.08	6.6-7.8	0-0	Low-------	0.10	1	8	1-2
	5-12	40-60	1.35-1.45	0.01-0.06	0.14-0.16	6.6-7.8	0-0	High------	0.24			
	12-27	---	---	---	---	---	---	----------	----			
	27-31	---	---	---	---	---	---	----------	----			
Vansickle-------	0-6	15-18	1.35-1.50	0.6-2.0	0.07-0.09	6.1-7.3	0-0	Low-------	0.15	2	7	1-2
	6-20	40-60	1.25-1.40	0.06-0.2	0.08-0.10	6.1-7.3	0-0	Moderate	0.10			
	20-24	---	---	---	---	---	---	----------	----			
	24-28	---	---	---	---	---	---	----------	----			
206:												
Jellycamp-------	0-11	20-27	1.35-1.50	0.6-2.0	0.06-0.10	6.6-7.8	0-0	Low-------	0.10	1	8	1-2
	11-19	40-60	1.35-1.45	0.01-0.06	0.14-0.16	6.6-7.8	0-0	High------	0.24			
	19-30	---	---	---	---	---	---	----------	----			
	30-34	---	---	---	---	---	---	----------	----			
Vansickle-------	0-6	15-18	1.35-1.50	0.6-2.0	0.07-0.09	6.1-7.3	0-0	Low-------	0.15	2	7	1-2
	6-20	40-60	1.25-1.40	0.06-0.2	0.08-0.10	6.1-7.3	0-0	Moderate	0.10			
	20-30	---	---	---	---	---	---	----------	----			
	30-34	---	---	---	---	---	---	----------	----			
207, 208:												
Jimmerson loam--	0-5	12-20	0.95-1.00	0.6-2.0	0.47-0.50	5.6-7.3	0-0	Low-------	0.28	5	2	5-7
	5-24	18-30	1.00-1.20	0.6-2.0	0.15-0.18	5.6-7.3	0-0	Moderate	0.28			
	24-36	27-35	1.30-1.40	0.2-0.6	0.16-0.18	5.6-7.3	0-0	Moderate	0.32			
	36-50	35-50	1.45-1.60	0.06-0.2	0.05-0.10	5.6-7.3	0-0	Moderate	0.32			
	50-62	35-50	1.45-1.50	0.06-0.2	0.05-0.10	5.6-7.3	0-0	Moderate	0.20			
	62-70	35-50	1.45-1.60	0.06-0.2	0.10-0.15	5.6-7.3	0-0	Moderate	0.32			
Jimmerson stony sandy loam-----	0-12	12-18	0.95-1.00	2.0-6.0	0.38-0.44	5.6-7.3	0-0	Low-------	0.15	5	3	5-7
	12-20	18-30	1.00-1.20	0.6-2.0	0.11-0.15	5.6-7.3	0-0	Moderate	0.17			
	20-38	27-35	1.30-1.40	0.2-0.6	0.16-0.18	5.6-7.3	0-0	Moderate	0.32			
	38-60	35-50	1.45-1.60	0.06-0.2	0.05-0.10	5.6-7.3	0-0	Moderate	0.32			
209:												
Jimmerson stony loam-----------	0-12	12-18	0.95-1.00	2.0-6.0	0.38-0.44	5.6-7.3	0-0	Low-------	0.15	5	3	5-7
	12-20	18-30	1.00-1.20	0.6-2.0	0.11-0.15	5.6-7.3	0-0	Moderate	0.17			
	20-38	27-35	1.30-1.40	0.2-0.6	0.16-0.18	5.6-7.3	0-0	Moderate	0.32			
	38-60	35-50	1.45-1.60	0.06-0.2	0.05-0.10	5.6-7.3	0-0	Moderate	0.32			
Jimmerson loam--	0-5	12-20	0.95-1.00	0.6-2.0	0.47-0.50	5.6-7.3	0-0	Low-------	0.28	5	2	5-7
	5-24	18-30	1.00-1.20	0.6-2.0	0.15-0.18	5.6-7.3	0-0	Moderate	0.28			
	24-36	27-35	1.30-1.40	0.2-0.6	0.16-0.18	5.6-7.3	0-0	Moderate	0.32			
	36-50	35-50	1.45-1.60	0.06-0.2	0.05-0.10	5.6-7.3	0-0	Moderate	0.32			
	50-62	35-50	1.45-1.50	0.06-0.2	0.05-0.10	5.6-7.3	0-0	Moderate	0.20			
	62-70	35-50	1.45-1.60	0.06-0.2	0.10-0.15	5.6-7.3	0-0	Moderate	0.32			

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
210:												
Karcal----------	0-15	40-60	1.00-1.10	0.06-0.2	0.10-0.13	6.6-7.3	0-0	High------	0.17	2	8	.5-1
	15-29	40-60	1.10-1.35	0.06-0.2	0.12-0.15	7.4-8.4	0-2	High------	0.28			
	29-33	---	---	---	---	---	---	----------	----			
Cuppy-----------	0-2	40-60	1.10-1.35	0.06-0.2	0.12-0.14	6.6-7.8	0-0	High------	0.20	2	8	1-2
	2-18	40-60	1.10-1.35	0.06-0.2	0.14-0.16	7.4-8.4	0-2	High------	0.28			
	18-29	35-50	1.10-1.35	0.06-0.2	0.15-0.17	7.9-8.4	0-2	High------	0.28			
	29-31	0-0	---	---	---	---	---	----------	----			
	31-41	---	---	---	---	---	---	----------	----			
211-------------- Keddie	0-4	0-0	0.40-0.60	6.0-20	0.26-0.30	6.6-7.3	0-0	Low-------	0.02	4	5	25-40
	4-42	18-27	1.35-1.50	0.6-2.0	0.15-0.17	6.1-7.3	0-0	Low-------	0.32			
	42-60	10-25	1.50-1.70	2.0-6.0	0.04-0.08	6.1-7.3	0-0	Low-------	0.10			
212-------------- Keddie	0-21	18-27	1.35-1.50	0.6-2.0	0.15-0.17	6.1-7.3	0-0	Low-------	0.32	5	6	1-3
	21-47	18-27	1.35-1.50	0.6-2.0	0.15-0.17	6.1-7.3	0-0	Low-------	0.24			
	47-60	18-27	1.50-1.60	0.6-2.0	0.12-0.15	6.1-7.3	0-0	Low-------	0.20			
213-------------- Keddie	0-9	15-27	1.30-1.40	0.6-2.0	0.16-0.18	6.1-7.3	0-0	Low-------	0.37	5	6	2-4
	9-60	27-35	1.30-1.40	0.2-0.6	0.16-0.18	6.6-7.8	0-0	Moderate	0.32			
214:												
Kephart---------	0-3	3-10	0.80-0.90	>20	0.21-0.25	6.1-6.5	0-0	Low-------	0.05	5	8	2-5
	3-8	1-5	0.80-0.90	>20	0.20-0.23	6.1-6.5	0-0	Low-------	0.02			
	8-19	10-18	0.85-0.90	6.0-20	0.09-0.11	6.1-6.5	0-0	Low-------	0.15			
	19-25	12-20	0.85-0.90	2.0-6.0	0.10-0.12	6.1-6.5	0-0	Low-------	0.15			
	25-68	20-27	0.95-1.20	0.2-0.6	0.14-0.17	6.1-7.3	0-0	Low-------	0.20			
Quaking---------	0-3	---	0.70-0.85	>20	0.21-0.25	5.6-6.5	0-0	Low-------	0.10	5	4	6-9
	3-7	---	0.70-0.85	>20	0.20-0.23	5.6-6.5	0-0	Low-------	0.10			
	7-14	10-18	0.85-0.95	6.0-20	0.07-0.10	6.1-6.5	0-0	Low-------	0.10			
	14-21	18-20	0.85-0.95	2.0-6.0	0.04-0.09	6.1-6.5	0-0	Low-------	0.10			
	21-32	20-27	0.95-1.00	0.2-0.6	0.03-0.07	6.1-6.5	0-0	Low-------	0.10			
	32-64	15-18	1.00-1.20	2.0-6.0	0.02-0.05	6.1-6.5	0-0	Low-------	0.10			
215-------------- Kettlebelly	0-10	20-27	1.30-1.50	0.6-2.0	0.11-0.14	5.6-6.5	0-0	Low-------	0.20	5	7	1-4
	10-67	35-50	1.30-1.40	0.2-0.6	0.15-0.17	5.1-6.0	0-0	Moderate	0.28			
	67-99	20-35	1.30-1.45	0.2-0.6	0.15-0.19	5.1-6.0	0-0	Moderate	0.43			
	99	---	---	---	---	---	---	----------	----			
216:												
Kettlebelly-----	0-4	20-27	1.20-1.50	0.6-2.0	0.14-0.18	5.6-6.5	0-0	Low-------	0.10	5	7	3-6
	4-22	20-27	1.30-1.70	0.6-2.0	0.10-0.14	5.6-6.5	0-0	Low-------	0.10			
	22-30	27-35	1.50-1.70	0.2-0.6	0.12-0.15	5.1-6.0	0-0	Moderate	0.24			
	30-99	27-35	1.50-1.70	0.2-0.6	0.09-0.16	5.1-6.0	0-0	Moderate	0.37			
Neuns-----------	0-3	6-17	1.35-1.50	0.6-2.0	0.08-0.10	5.1-6.5	0-0	Low-------	0.15	2	4	5-11
	3-32	8-18	1.35-1.50	0.6-2.0	0.05-0.08	5.1-6.5	0-0	Low-------	0.10			
	32-36	---	---	---	---	---	---	----------	----			
217:												
Kettlebelly-----	0-4	20-27	1.20-1.50	0.6-2.0	0.14-0.18	5.6-6.5	0-0	Low-------	0.10	5	7	3-6
	4-22	20-27	1.30-1.70	0.6-2.0	0.10-0.14	5.6-6.5	0-0	Low-------	0.10			
	22-30	35-50	1.50-1.70	0.2-0.6	0.12-0.15	5.1-6.0	0-0	Moderate	0.24			
	30-99	35-50	1.50-1.70	0.2-0.6	0.09-0.16	5.1-6.0	0-0	Moderate	0.37			
Neuns-----------	0-3	6-17	1.35-1.50	0.6-2.0	0.08-0.10	5.1-6.5	0-0	Low-------	0.15	2	4	5-11
	3-32	8-18	1.35-1.50	0.6-2.0	0.05-0.08	5.1-6.5	0-0	Low-------	0.10			
	32-36	---	---	---	---	---	---	----------	----			

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
218, 219:												
Kettlebelly-----	0-10	20-27	1.30-1.50	0.6-2.0	0.11-0.14	5.6-6.5	0-0	Low-------	0.20	5	7	1-4
	10-67	35-50	1.30-1.40	0.2-0.6	0.15-0.17	5.1-6.0	0-0	Moderate	0.28			
	67-99	20-35	1.30-1.45	0.2-0.6	0.15-0.19	5.1-6.0	0-0	Moderate	0.43			
	99-	---	---	---	---	---	---	----------	----			
Neuns-----------	0-7	6-17	1.35-1.50	0.6-2.0	0.08-0.10	5.1-6.5	0-0	Low-------	0.15	2	4	5-11
	7-32	8-18	1.35-1.50	0.6-2.0	0.05-0.08	5.1-6.5	0-0	Low-------	0.10			
	32-36	---	---	---	---	---	---	----------	----			
220, 221, 222---- Kilarc	0-7	15-25	1.50-1.70	0.6-2.0	0.14-0.17	5.6-6.5	0-0	Low-------	0.43	3	6	2-6
	7-24	50-60	1.40-1.60	0.06-0.2	0.08-0.13	4.5-5.0	0-0	High------	0.20			
	24-50	40-50	1.45-1.65	0.06-0.2	0.04-0.07	4.5-5.0	0-0	High------	0.15			
	50-54	---	---	---	---	---	---	----------	----			
223, 224:												
Kindig----------	0-2	5-15	1.40-1.50	0.6-2.0	0.06-0.10	5.6-7.3	0-0	Low-------	0.24	4	4	2-4
	2-8	6-18	1.35-1.50	0.6-2.0	0.06-0.12	5.6-6.5	0-0	Low-------	0.24			
	8-14	6-18	1.35-1.50	0.6-2.0	0.05-0.09	5.6-6.5	0-0	Low-------	0.15			
	14-49	6-18	1.35-1.50	0.6-2.0	0.05-0.09	5.6-6.5	0-0	Low-------	0.15			
	49-53	---	---	---	---	---	---	----------	----			
Neuns-----------	0-3	6-17	1.35-1.50	0.6-2.0	0.08-0.10	5.1-6.5	0-0	Low-------	0.15	2	4	5-11
	3-32	8-18	1.35-1.50	0.6-2.0	0.05-0.08	5.1-6.5	0-0	Low-------	0.10			
	32-36	---	---	---	---	---	---	----------	----			
225:												
Lassen----------	0-2	40-60	1.20-1.35	0.06-0.2	0.09-0.13	6.6-7.8	0-0	High------	0.20	2	8	1-2
	2-28	35-60	1.20-1.35	0.06-0.2	0.14-0.16	6.6-8.4	0-2	High------	0.28			
	28-32	---	---	---	---	---	---	----------	----			
Cuppy-----------	0-2	40-60	1.10-1.35	0.06-0.2	0.12-0.14	6.6-7.8	0-0	High------	0.20	2	8	1-2
	2-18	40-60	1.10-1.35	0.06-0.2	0.14-0.16	7.4-8.4	0-2	High------	0.28			
	18-29	35-50	1.10-1.35	0.06-0.2	0.15-0.17	7.9-8.4	0-2	High------	0.28			
	29-31	0-0	---	---	---	---	---	----------	----			
	31-41	---	---	---	---	---	---	----------	----			
226------------- Lasvar	0-2	45-55	1.00-1.20	0.06-0.2	0.15-0.17	6.6-7.3	0-0	High------	0.20	2	7	1-2
	2-30	45-55	1.00-1.20	0.06-0.2	0.15-0.17	6.6-7.8	0-0	High------	0.20			
	30-38	25-35	1.00-1.20	0.2-2.0	0.17-0.20	7.9-8.4	0-0	Moderate	0.43			
	38-42	---	---	---	---	8.5-9.0	0-0	----------	----			
227:												
Lasvar----------	0-3	45-55	1.00-1.20	0.06-0.2	0.15-0.17	6.6-7.3	0-0	High------	0.20	2	7	1-2
	3-28	45-55	1.00-1.20	0.06-0.2	0.15-0.17	6.6-7.8	0-0	High------	0.20			
	28-31	25-35	1.00-1.20	0.2-2.0	0.17-0.20	7.9-8.4	0-0	Moderate	0.43			
	31-60	---	---	---	---	8.5-9.0	0-0	----------	----			
Pitvar----------	0-36	40-50	1.00-1.20	0.06-0.2	0.16-0.17	7.4-7.8	0-0	High------	0.20	3	4	1-2
	36-55	40-60	1.00-1.20	0.06-0.2	0.14-0.17	7.4-8.4	0-0	High------	0.20			
	55-58	0-0	---	---	---	7.4-8.4	0-0	----------	----			
	58-72	35-40	1.00-1.20	0.2-0.6	0.14-0.16	7.4-8.4	0-0	Moderate	0.28			
228------------- Lava flows	0-60	0-0	---	---	---	---	0-0	----------	----	---	---	---
229:												
Lava flows------	0-60	0-0	---	---	---	---	0-0	----------	----	---	---	---

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
229:												
Gassaway--------	0-3	14-16	0.85-0.95	0.6-2.0	0.10-0.14	6.1-7.3	0-0	Low-------	0.20	1	6	1-3
	3-12	15-18	1.00-1.20	0.6-2.0	0.10-0.15	6.1-7.3	0-0	Low-------	0.20			
	12-22	---	---	---	---	---	---	----------	----			
230:												
Lava flows------	0-60	0-0	---	---	---	---	0-0	----------	----	---	---	---
Neer------------	0-6	---	0.50-1.00	6.0-20	0.27-0.33	5.1-7.3	0-0	Low-------	0.10	2	4	4-15
	6-32	---	1.00-1.40	6.0-20	0.27-0.33	5.1-7.3	0-0	Low-------	0.10			
	32-36	---	---	---	---	---	---	----------	----			
231-------------- Longbell	0-3	---	0.85-0.90	2.0-6.0	0.16-0.25	6.1-6.5	0-0	Low-------	0.15	5	4	2-3
	3-30	---	0.85-1.10	>20	0.08-0.10	6.1-7.3	0-0	Low-------	0.15			
	30-42	3-5	1.00-1.20	>20	0.05-0.07	6.6-7.3	0-0	Low-------	0.10			
	42-72	2-5	1.10-1.30	>20	0.03-0.05	6.6-7.3	0-0	Low-------	0.10			
232:												
Longbell--------	0-3	---	0.85-0.90	2.0-6.0	0.16-0.25	6.1-6.5	0-0	Low-------	0.15	5	4	2-3
	3-30	---	0.85-1.10	>20	0.08-0.10	6.1-7.3	0-0	Low-------	0.15			
	30-42	3-5	1.00-1.20	>20	0.05-0.07	6.6-7.3	0-0	Low-------	0.10			
	42-72	2-5	1.10-1.30	>20	0.03-0.05	6.6-7.3	0-0	Low-------	0.10			
Lava flows------	0-60	0-0	---	---	---	---	0-0	----------	----	---	---	---
233:												
Longbilly-------	0-4	10-20	1.35-1.55	0.06-0.2	0.18-0.20	7.9-9.0	0-2	Low-------	0.49	2	5	1-2
	4-54	35-50	1.00-1.10	0.01-0.06	0.06-0.09	8.5-9.0	2-4	High------	0.37			
	54-60	25-35	1.15-1.25	0.06-0.2	0.16-0.18	8.5-9.0	0-2	Moderate	0.32			
Modoc-----------	0-3	0-20	1.45-1.55	0.6-2.0	0.11-0.13	6.1-7.8	<2	Low-------	0.24	2	3	1-2
	3-32	25-35	1.35-1.50	0.2-0.6	0.15-0.19	6.6-8.4	<2	Moderate	0.28			
	32-60	---	---	---	---	---	---	----------	----			
234:												
Longbilly-------	0-4	10-20	1.35-1.55	0.06-0.2	0.18-0.20	7.9-9.0	0-2	Low-------	0.49	2	5	1-2
	4-54	35-50	1.00-1.10	0.01-0.06	0.06-0.09	8.5-9.0	2-4	High------	0.37			
	54-60	25-35	1.15-1.25	0.06-0.2	0.16-0.18	8.5-9.0	0-2	Moderate	0.32			
Pit-------------	0-4	40-60	1.20-1.30	0.06-0.2	0.14-0.16	6.6-7.8	0-2	High------	0.32	5	7	1-4
	4-40	35-60	1.20-1.30	0.06-0.2	0.16-0.19	7.4-8.4	0-4	High------	0.37			
	40-45	30-40	1.35-1.45	0.06-0.2	0.16-0.19	7.4-8.4	0-4	Moderate	0.37			
	45-60	20-27	1.40-1.50	0.2-0.6	0.15-0.17	7.4-8.4	0-4	Low-------	0.43			
235:												
Longcreek-------	0-3	20-27	1.45-1.55	0.6-2.0	0.07-0.09	6.6-7.3	0-0	Low-------	0.17	1	8	1-4
	3-16	35-40	1.30-1.50	0.06-0.2	0.08-0.10	6.6-7.8	0-0	Low-------	0.17			
	16-20	---	---	0.00-0.01	---	---	---	----------	----			
Vansickle-------	0-1	15-18	1.35-1.50	0.6-2.0	0.07-0.09	6.1-7.3	0-0	Low-------	0.15	2	7	1-2
	1-6	15-18	1.35-1.50	0.6-2.0	0.05-0.07	6.1-7.3	0-0	Low-------	0.10			
	6-13	40-60	1.25-1.40	0.06-0.2	0.08-0.10	6.1-7.3	0-0	Moderate	0.10			
	13-14	---	---	---	---	---	---	----------	----			
	14-24	---	---	---	---	---	---	----------	----			
Rock outcrop----	0-60	0-0	---	---	0.0-0.0	---	0-0	----------	----	---	---	0-0

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
236:												
Lonkey----------	0-8	18-27	1.00-1.20	0.6-2.0	0.14-0.18	6.1-6.5	0-0	Low-------	0.37	3	6	1-2
	8-13	27-30	1.00-1.20	0.2-0.6	0.17-0.21	6.1-7.3	0-0	Moderate	0.32			
	13-38	27-30	1.00-1.20	0.2-0.6	0.17-0.21	6.1-7.3	0-0	Moderate	0.32			
	38-48	---	---	---	---	---	---	----------	----			
Datom-----------	0-3	27-35	0.70-0.75	0.2-0.6	0.23-0.25	6.6-7.3	0-0	Moderate	0.32	2	2	4-9
	3-12	35-40	0.80-0.95	0.06-0.2	0.25-0.27	6.6-7.3	0-0	Moderate	0.37			
	12-16	40-50	0.75-0.80	0.06-0.2	0.26-0.28	6.6-7.3	0-0	Moderate	0.37			
	16-20	---	---	---	---	---	---	----------	----			
237, 238:												
Lonkey----------	0-4	15-20	1.35-1.50	2.0-6.0	0.09-0.11	6.6-7.3	0-0	Low-------	0.20	2	4	2-4
	4-14	20-30	1.35-1.50	0.2-0.6	0.14-0.18	6.6-7.3	0-0	Moderate	0.32			
	14-19	27-35	1.35-1.55	0.2-0.6	0.12-0.15	6.6-7.3	0-0	Moderate	0.20			
	19-24	40-50	1.35-1.45	0.06-0.2	0.11-0.15	6.6-7.3	0-0	High------	0.20			
	24-34	---	---	---	---	---	---	----------	----			
Malinda---------	0-2	15-18	1.35-1.50	2.0-6.0	0.06-0.08	6.1-7.3	0-0	Low-------	0.15	1	5	1-3
	2-11	18-27	1.35-1.50	0.6-2.0	0.12-0.16	6.6-7.3	0-0	Low-------	0.24			
	11-16	27-35	1.35-1.50	0.2-0.6	0.15-0.19	6.6-7.3	0-0	Moderate	0.32			
	16-26	---	---	---	---	---	---	----------	----			
239:												
Lonkey----------	0-16	15-20	1.35-1.50	2.0-6.0	0.09-0.11	6.6-7.3	0-0	Low-------	0.20	2	4	2-4
	16-25	20-35	1.35-1.55	0.2-0.6	0.12-0.15	6.6-7.3	0-0	Moderate	0.20			
	25-28	40-50	1.35-1.45	0.06-0.2	0.11-0.15	6.6-7.3	0-0	High------	0.20			
	28-32	---	---	---	---	---	---	----------	----			
Malinda---------	0-2	15-18	1.35-1.50	2.0-6.0	0.06-0.08	6.1-7.3	0-0	Low-------	0.15	1	5	1-3
	2-6	18-27	1.35-1.50	0.6-2.0	0.12-0.16	6.6-7.3	0-0	Low-------	0.24			
	6-17	27-35	1.35-1.50	0.2-0.6	0.15-0.19	6.6-7.3	0-0	Moderate	0.32			
	17-21	---	---	---	---	---	---	----------	----			
240, 241:												
Loveness--------	0-7	15-20	0.80-0.90	2.0-6.0	0.12-0.16	6.1-7.3	0-0	Low-------	0.20	4	2	2-5
	7-12	18-23	0.80-0.90	0.6-2.0	0.15-0.17	6.1-7.3	0-0	Low-------	0.32			
	12-19	23-30	0.95-1.10	0.2-2.0	0.12-0.14	6.1-7.3	0-0	Low-------	0.17			
	19-35	30-35	0.95-1.10	0.2-0.6	0.13-0.17	6.1-7.3	0-0	Low-------	0.15			
	35-60	27-35	0.95-1.10	0.2-0.6	0.04-0.09	6.1-7.3	0-0	Low-------	0.10			
Fleener---------	0-4	---	1.00-1.10	2.0-6.0	0.11-0.13	6.1-7.3	0-0	Low-------	0.28	5	2	2-5
	4-10	---	1.00-1.15	2.0-6.0	0.09-0.11	6.1-7.3	0-0	Low-------	0.17			
	10-28	15-35	1.20-1.40	0.6-2.0	0.07-0.12	6.1-7.3	0-0	Low-------	0.10			
	28-60	20-35	1.20-1.40	0.2-0.6	0.04-0.06	6.1-7.3	0-0	Low-------	0.10			
242------------- Lunsford	0-13	15-20	0.80-0.90	0.2-0.6	0.15-0.17	7.9-9.0	0-2	Low-------	0.28	5	4L	4-7
	13-29	20-25	0.85-0.90	0.2-0.6	0.15-0.17	7.9-8.4	0-2	Low-------	0.24			
	29-60	25-30	0.85-0.95	0.2-0.6	0.15-0.17	7.4-8.4	0-2	Moderate	0.24			
243, 244, 245---- Malinda	0-3	15-18	1.35-1.50	2.0-6.0	0.03-0.05	6.1-7.3	0-0	Low-------	0.10	1	8	1-3
	3-8	18-27	1.35-1.50	0.6-2.0	0.12-0.16	6.6-7.3	0-0	Low-------	0.24			
	8-14	27-35	1.35-1.50	0.2-0.6	0.15-0.19	6.6-7.3	0-0	Moderate	0.32			
	14-18	---	---	---	---	---	---	----------	----			
246------------- Malinda	0-3	15-18	1.40-1.50	0.6-2.0	0.06-0.09	6.6-7.3	0-0	Low-------	0.10	1	8	1-3
	3-8	20-27	1.40-1.50	0.6-2.0	0.16-0.18	6.6-7.3	0-0	Low-------	0.10			
	8-13	27-35	1.50-1.60	0.2-0.6	0.15-0.17	6.6-7.3	0-0	Moderate	0.28			
	13-17	27-35	1.50-1.60	0.2-0.6	0.15-0.17	6.6-7.3	0-0	Moderate	0.32			
	17-21	---	---	---	---	---	---	----------	----			

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
247 Matquaw	0-4	10-15	1.40-1.55	2.0-6.0	0.08-0.10	5.6-6.5	0-0	Low	0.20	3	4	4-8
	4-10	10-15	1.50-1.60	2.0-6.0	0.10-0.13	5.6-6.5	0-0	Low	0.24			
	10-27	10-15	1.50-1.60	2.0-6.0	0.14-0.16	5.6-6.5	0-0	Low	0.37			
	27-34	5-10	1.60-1.70	6.0-20	0.06-0.08	5.6-6.5	0-0	Low	0.20			
	34-72	5-10	1.60-1.70	6.0-20	0.02-0.05	5.6-6.5	0-0	Low	0.05			
248 Matquaw	0-4	10-15	1.40-1.55	2.0-6.0	0.06-0.08	5.6-6.5	0-0	Low	0.15	3	5	4-8
	4-10	10-15	1.50-1.60	2.0-6.0	0.10-0.13	5.6-6.5	0-0	Low	0.24			
	10-27	10-15	1.50-1.60	2.0-6.0	0.14-0.16	5.6-6.5	0-0	Low	0.37			
	27-34	5-10	1.60-1.70	6.0-20	0.06-0.08	5.6-6.5	0-0	Low	0.20			
	34-72	5-10	1.60-1.70	6.0-20	0.02-0.05	5.6-6.5	0-0	Low	0.05			
249:												
Medici	0-1	---	0.70-0.90	6.0-20	0.37-0.39	5.6-6.5	0-0	Low	0.20	5	2	2-8
	1-19	---	0.70-0.90	6.0-20	0.30-0.33	5.6-6.5	0-0	Low	0.15			
	19-51	12-18	0.70-0.90	6.0-20	0.05-0.10	6.1-7.3	0-0	Low	0.10			
	51-67	12-18	0.70-0.90	2.0-6.0	0.07-0.12	6.1-7.3	0-0	Low	0.10			
	67-75	5-12	0.70-0.90	6.0-20	0.06-0.10	6.1-7.3	0-0	Low	0.10			
Blankout	0-9	---	0.85-0.95	6.0-20	0.35-0.38	6.1-6.5	0-0	Low	0.20	5	2	2-6
	9-18	---	1.00-1.10	6.0-20	0.35-0.37	6.1-7.3	0-0	Low	0.20			
	18-62	15-18	1.00-1.10	6.0-20	0.08-0.12	6.1-7.3	0-0	Low	0.10			
	62-81	15-18	1.00-1.10	6.0-20	0.06-0.08	6.1-7.3	0-0	Low	0.05			
250, 251 Medlake	0-2	---	0.90-1.00	6.0-20	0.30-0.32	5.6-6.5	0-0	Low	0.10	5	8	3-13
	2-6	---	0.90-1.00	>20	0.24-0.27	5.6-6.5	0-0	Low	0.10			
	6-32	---	0.80-0.95	>20	0.20-0.23	6.1-7.3	0-0	Low	0.10			
	32-69	---	0.95-1.00	6.0-20	0.13-0.17	5.6-7.3	0-0	Low	0.10			
	69-75	---	0.95-1.00	2.0-6.0	0.16-0.21	5.6-6.0	0-0	Low	0.20			
252 Modoc	0-3	15-25	1.40-1.50	0.6-2.0	0.14-0.17	6.1-7.8	<2	Low	0.32	2	5	1-2
	3-32	25-35	1.35-1.50	0.2-0.6	0.15-0.19	6.6-8.4	<2	Moderate	0.28			
	32-60	---	---	---	---	---	---	----------	----			
253 Modoc	0-3	0-20	1.45-1.55	0.6-2.0	0.11-0.13	6.1-7.8	<2	Low	0.24	2	3	1-2
	3-32	25-35	1.35-1.50	0.2-0.6	0.15-0.19	6.6-8.4	<2	Moderate	0.28			
	32-60	---	---	---	---	---	---	----------	----			
254:												
Mounthat	0-10	8-18	0.40-0.60	6.0-20	0.50-0.53	5.6-6.5	0-0	Low	0.10	3	3	25-50
	10-21	10-20	0.40-0.70	2.0-6.0	0.33-0.35	5.6-6.5	0-0	Low	0.10			
	21-27	10-20	0.50-0.80	2.0-6.0	0.26-0.31	5.6-6.5	0-0	Low	0.10			
	27-37	---	---	---	---	---	---	----------	----			
Rock outcrop	0-60	0-0	---	---	0.0-0.0	---	0-0	----------	----	---	---	0-0
255 Murken	0-7	18-25	1.20-1.40	0.6-2.0	0.08-0.11	6.1-7.3	0-0	Low	0.17	2	8	1-2
	7-23	18-25	1.20-1.40	0.6-2.0	0.08-0.10	6.1-7.3	0-0	Low	0.20			
	23-33	18-25	1.25-1.45	0.6-2.0	0.07-0.09	6.1-7.3	0-0	Low	0.15			
	33-43	---	---	---	---	---	---	----------	----			
256 Nanny	0-8	10-18	1.35-1.50	2.0-6.0	0.11-0.14	5.1-6.5	0-0	Low	0.10	5	4	3-10
	8-60	10-18	1.35-1.50	2.0-6.0	0.06-0.09	4.5-6.0	0-0	Low	0.10			
257 Neer	0-16	---	0.50-0.80	6.0-20	0.38-0.40	5.1-6.5	0-0	Low	0.17	3	2	4-15
	16-36	---	0.50-0.80	6.0-20	0.27-0.33	5.1-6.5	0-0	Low	0.10			
	36-40	---	---	---	---	---	---	----------	----			

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
258:												
Neer-----------	0-10	---	0.50-0.80	6.0-20	0.38-0.40	5.1-6.5	0-0	Low-------	0.17	3	2	4-15
	10-24	---	0.50-0.80	6.0-20	0.27-0.33	5.1-6.5	0-0	Low-------	0.10			
	24-39	---	1.00-1.20	6.0-20	0.27-0.33	5.1-6.5	0-0	Low-------	0.10			
	39-43	---	---	---	---	---	---	----------	----			
Ponto----------	0-6	---	0.50-0.90	2.0-6.0	0.43-0.45	5.6-7.3	0-0	Low-------	0.17	5	2	5-12
	6-62	---	0.50-0.90	2.0-6.0	0.45-0.50	6.1-7.3	0-0	Low-------	0.20			
259, 260:												
Neer-----------	0-16	---	0.50-0.80	6.0-20	0.38-0.40	5.1-6.5	0-0	Low-------	0.17	3	2	4-15
	16-36	---	0.50-0.80	6.0-20	0.27-0.33	5.1-6.5	0-0	Low-------	0.10			
	36-40	---	---	---	---	---	---	----------	----			
Ponto----------	0-8	---	0.50-0.90	2.0-6.0	0.43-0.45	5.6-7.3	0-0	Low-------	0.17	5	2	5-12
	8-68	---	0.50-0.90	2.0-6.0	0.45-0.50	6.1-7.3	0-0	Low-------	0.20			
261:												
Neuns----------	0-7	6-17	1.35-1.50	0.6-2.0	0.08-0.10	5.1-6.5	0-0	Low-------	0.15	2	4	5-11
	7-32	8-18	1.35-1.50	0.6-2.0	0.05-0.08	5.1-6.5	0-0	Low-------	0.10			
	32-36	---	---	---	---	---	---	----------	----			
Kettlebelly-----	0-10	20-27	1.30-1.50	0.6-2.0	0.11-0.14	5.6-6.5	0-0	Low-------	0.20	5	7	1-4
	10-67	35-50	1.30-1.40	0.2-0.6	0.15-0.17	5.1-6.0	0-0	Moderate	0.28			
	67-99	20-35	1.30-1.45	0.2-0.6	0.15-0.19	5.1-6.0	0-0	Moderate	0.43			
	99-99	---	---	---	---	---	---	----------	----			
262:												
Neuns----------	0-3	6-17	1.35-1.50	0.6-2.0	0.08-0.10	5.1-6.5	0-0	Low-------	0.15	2	4	5-11
	3-32	8-18	1.35-1.50	0.6-2.0	0.05-0.08	5.1-6.5	0-0	Low-------	0.10			
	32-36	---	---	---	---	---	---	----------	----			
Kettlebelly-----	0-4	20-27	1.20-1.50	0.6-2.0	0.14-0.18	5.6-6.5	0-0	Low-------	0.10	5	7	3-6
	4-22	20-27	1.30-1.70	0.6-2.0	0.10-0.14	5.6-6.5	0-0	Low-------	0.10			
	22-30	27-35	1.50-1.70	0.2-0.6	0.12-0.15	5.1-6.0	0-0	Moderate	0.24			
	30-99	27-35	1.50-1.70	0.2-0.6	0.09-0.16	5.1-6.0	0-0	Moderate	0.37			
263:												
Neuns----------	0-3	6-17	1.35-1.50	0.6-2.0	0.08-0.10	5.1-6.5	0-0	Low-------	0.15	2	4	5-11
	3-32	8-18	1.35-1.50	0.6-2.0	0.05-0.08	5.1-6.5	0-0	Low-------	0.10			
	32-36	---	---	---	---	---	---	----------	----			
Kindig----------	0-2	5-15	1.40-1.50	0.6-2.0	0.06-0.10	5.6-7.3	0-0	Low-------	0.24	4	4	2-4
	2-8	6-18	1.35-1.50	0.6-2.0	0.06-0.12	5.6-6.5	0-0	Low-------	0.24			
	8-14	6-18	1.35-1.50	0.6-2.0	0.05-0.09	5.6-6.5	0-0	Low-------	0.15			
	14-49	6-18	1.35-1.50	0.6-2.0	0.05-0.09	5.6-6.5	0-0	Low-------	0.15			
	49-53	---	---	---	---	---	---	----------	----			
264:												
Nikal-----------	0-18	---	0.80-0.90	2.0-6.0	0.44-0.48	5.6-6.5	0-0	Low-------	0.20	2	2	2-8
	18-28	---	0.85-1.00	2.0-6.0	0.35-0.38	5.6-6.5	0-0	Low-------	0.15			
	28-36	---	0.85-1.20	2.0-6.0	0.28-0.32	5.6-6.5	0-0	Low-------	0.10			
	36-46	---	---	---	---	---	---	----------	----			
Chatterdown-----	0-15	---	0.80-0.95	2.0-6.0	0.47-0.50	6.1-7.3	0-0	Low-------	0.20	5	2	8-12
	15-30	3-5	0.85-0.95	2.0-6.0	0.35-0.43	6.1-7.3	0-0	Low-------	0.15			
	30-47	3-5	0.95-1.05	2.0-6.0	0.32-0.40	6.1-7.3	0-0	Low-------	0.15			
	47-63	3-5	1.10-1.20	2.0-6.0	0.30-0.35	6.1-7.3	0-0	Low-------	0.15			
	63-67	---	---	---	---	---	---	----------	----			
Lava flows------	0-60	0-0	---	---	---	---	0-0	----------	----	---	---	---

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
265-------------- Nosoni	0-2	18-27	1.45-1.55	0.6-2.0	0.16-0.18	6.6-7.3	0-0	Low-------	0.32	5	6	2-4
	2-8	20-27	1.40-1.55	0.2-0.6	0.14-0.16	6.6-7.3	0-0	Low-------	0.17			
	8-80	27-35	1.40-1.55	0.2-0.6	0.14-0.16	6.6-7.3	0-0	Moderate	0.28			
266, 267:												
Obie------------	0-7	5-15	0.70-0.80	2.0-6.0	0.50-0.53	5.6-6.0	0-0	Low-------	0.17	4	4	15-20
	7-20	5-15	0.80-0.90	2.0-6.0	0.48-0.50	5.6-6.0	0-0	Low-------	0.17			
	20-35	5-15	0.90-1.10	2.0-6.0	0.33-0.35	5.6-6.0	0-0	Low-------	0.10			
	35-46	5-15	0.90-1.10	2.0-6.0	0.26-0.31	5.1-6.0	0-0	Low-------	0.10			
	46-56	---	---	---	---	---	---	----------	----			
Mounthat--------	0-10	8-18	0.40-0.60	6.0-20	0.50-0.53	5.6-6.5	0-0	Low-------	0.10	3	3	25-50
	10-21	10-20	0.40-0.70	2.0-6.0	0.33-0.35	5.6-6.5	0-0	Low-------	0.10			
	21-27	10-20	0.50-0.80	2.0-6.0	0.26-0.31	5.6-6.5	0-0	Low-------	0.10			
	27-37	---	---	---	---	---	---	----------	----			
268:												
Obie------------	0-20	5-15	0.70-0.80	2.0-6.0	0.50-0.53	5.6-6.0	0-0	Low-------	0.17	4	4	15-20
	20-46	5-15	0.90-1.10	2.0-6.0	0.33-0.35	5.6-6.0	0-0	Low-------	0.10			
	46-50	---	---	---	---	---	---	----------	----			
Mounthat--------	0-10	8-18	0.40-0.60	6.0-20	0.50-0.53	5.6-6.5	0-0	Low-------	0.10	3	3	25-50
	10-21	10-20	0.40-0.70	2.0-6.0	0.33-0.35	5.6-6.5	0-0	Low-------	0.10			
	21-27	10-20	0.50-0.80	2.0-6.0	0.26-0.31	5.6-6.5	0-0	Low-------	0.10			
	27-37	---	---	---	---	---	---	----------	----			
269-------------- Odas	0-8	7-18	1.30-1.40	2.0-6.0	0.13-0.16	5.1-6.0	0-0	Low-------	0.24	5	5	4-6
	8-31	5-18	1.35-1.45	2.0-6.0	0.09-0.12	5.1-6.0	0-0	Low-------	0.20			
	31-60	5-18	1.35-1.50	2.0-6.0	0.09-0.15	5.1-6.0	0-0	Low-------	0.28			
270:												
Oxendine--------	0-3	20-30	1.40-1.50	0.6-2.0	0.10-0.12	6.1-7.3	0-0	Moderate	0.10	1	6	1-3
	3-5	25-35	1.40-1.50	0.2-0.6	0.15-0.18	6.1-7.3	0-0	Moderate	0.17			
	5-7	27-40	1.40-1.50	0.2-0.6	0.15-0.18	6.1-7.3	0-0	Moderate	0.24			
	7-9	40-50	1.35-1.45	0.06-0.2	0.12-0.15	6.1-7.3	0-0	High------	0.24			
	9-12	---	---	---	---	---	---	----------	----			
	12-22	---	---	---	---	---	---	----------	----			
Lonkey----------	0-8	18-27	1.00-1.20	0.6-2.0	0.14-0.18	6.1-6.5	0-0	Low-------	0.37	3	6	1-2
	8-13	27-30	1.00-1.20	0.2-0.6	0.17-0.21	6.1-7.3	0-0	Moderate	0.32			
	13-38	27-30	1.00-1.20	0.2-0.6	0.17-0.21	6.1-7.3	0-0	Moderate	0.32			
	38-48	---	---	---	---	---	---	----------	----			
271:												
Oxendine--------	0-2	15-20	1.35-1.50	2.0-6.0	0.04-0.06	6.6-7.3	0-0	Low-------	0.10	1	8	2-3
	2-10	25-35	1.35-1.55	0.2-0.6	0.13-0.16	6.6-7.3	0-0	Moderate	0.32			
	10-20	0-0	---	---	---	---	---	----------	----			
	20-30	---	---	---	---	---	---	----------	----			
Sweagert--------	0-7	12-25	1.40-1.55	0.6-2.0	0.14-0.16	6.6-7.3	0-0	Low-------	0.32	2	5	1-4
	7-25	25-35	1.40-1.55	0.2-0.6	0.16-0.19	6.6-7.3	0-0	Moderate	0.28			
	25-35	30-45	1.40-1.60	0.06-0.2	0.15-0.19	6.6-7.3	0-0	High------	0.28			
	35-60	---	---	---	---	7.4-8.4	---	Low-------	0.02			
272:												
Oxendine--------	0-3	15-20	1.35-1.50	2.0-6.0	0.05-0.09	6.6-7.3	0-0	Low-------	0.15	1	5	2-3
	3-13	25-35	1.35-1.55	0.2-0.6	0.13-0.16	6.6-7.3	0-0	Moderate	0.32			
	13-20	0-0	---	---	---	---	---	----------	----			
	20-24	---	---	---	---	---	---	----------	----			

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
272:												
Sweagert--------	0-3	12-15	1.50-1.60	2.0-6.0	0.09-0.11	6.1-7.3	0-0	Low-------	0.20	2	4	1-4
	3-6	15-25	1.40-1.55	0.6-2.0	0.13-0.16	6.1-7.3	0-0	Low-------	0.32			
	6-24	25-35	1.40-1.55	0.2-0.6	0.15-0.19	6.1-7.3	0-0	Moderate	0.28			
	24-26	30-45	1.40-1.60	0.06-0.2	0.10-0.13	6.6-7.3	0-0	High------	0.20			
	26-60	---	---	---	---	---	---	Low-------	0.02			
273:												
Oxendine--------	0-6	15-20	1.35-1.50	2.0-6.0	0.05-0.09	6.6-7.3	0-0	Low-------	0.15	1	5	2-3
	6-11	25-35	1.35-1.55	0.2-0.6	0.15-0.18	6.6-7.3	0-0	Moderate	0.32			
	11-13	25-35	1.45-1.55	0.2-0.6	0.07-0.10	6.6-7.3	0-0	Moderate	0.15			
	13-20	0-0	---	---	---	---	---	----------	----			
	20-24	---	---	---	---	---	---	----------	----			
Sweagert--------	0-3	12-15	1.50-1.60	2.0-6.0	0.09-0.11	6.1-7.3	0-0	Low-------	0.20	2	4	1-4
	3-6	15-25	1.40-1.55	0.6-2.0	0.13-0.16	6.1-7.3	0-0	Low-------	0.32			
	6-24	25-35	1.40-1.55	0.2-0.6	0.15-0.19	6.1-7.3	0-0	Moderate	0.28			
	24-26	30-45	1.40-1.60	0.06-0.2	0.10-0.13	6.6-7.3	0-0	High------	0.20			
	26-60	---	---	---	---	---	---	Low-------	0.02			
274-------------- Pastolla	0-5	30-35	0.35-0.45	0.6-2.0	0.40-0.42	6.6-8.4	0-2	Moderate	0.24	5	2	25-30
	5-10	25-35	0.45-0.50	0.6-2.0	0.37-0.39	7.9-9.0	0-2	Moderate	0.37			
	10-24	10-20	0.25-0.35	2.0-6.0	0.58-0.59	7.9-9.0	0-2	Low-------	0.37			
	24-31	20-45	0.50-0.80	0.06-0.2	0.46-0.48	7.9-9.0	0-2	Low-------	0.43			
	31-44	10-45	0.65-0.85	2.0-6.0	0.31-0.33	7.9-9.0	0-2	Moderate	0.49			
	44-60	10-20	0.85-1.00	0.6-2.0	0.09-0.11	7.9-9.0	0-2	Low-------	0.24			
275-------------- Pastolla	0-5	30-35	0.35-0.45	0.6-2.0	0.40-0.42	6.6-8.4	0-2	Moderate	0.24	5	2	25-30
	5-19	25-35	0.45-0.50	0.6-2.0	0.37-0.39	7.9-9.0	0-2	Moderate	0.37			
	19-22	10-20	0.25-0.35	2.0-6.0	0.58-0.59	7.9-9.0	0-2	Low-------	0.37			
	22-38	20-45	0.50-0.80	0.06-0.2	0.46-0.48	7.9-9.0	0-2	Low-------	0.43			
	38-55	10-45	0.65-0.85	2.0-6.0	0.31-0.33	7.9-9.0	0-2	Moderate	0.49			
	55-64	10-20	0.85-1.00	0.6-2.0	0.09-0.11	7.9-9.0	0-2	Low-------	0.24			
276-------------- Pastolla	0-5	25-35	0.45-0.50	0.6-2.0	0.37-0.39	6.6-8.4	0-2	Moderate	0.37	5	2	8-20
	5-22	10-20	0.25-0.35	2.0-6.0	0.58-0.59	7.9-9.0	0-2	Low-------	0.37			
	22-34	20-45	0.50-0.80	0.06-0.2	0.46-0.48	7.9-9.0	0-2	Low-------	0.43			
	34-64	10-45	0.65-0.85	2.0-6.0	0.31-0.33	7.9-9.0	0-2	Moderate	0.49			
277-------------- Patburn	0-2	15-25	1.40-1.50	2.0-6.0	0.14-0.17	6.1-7.3	0-0	Low-------	0.20	5	6	2-4
	2-13	30-40	1.35-1.45	0.2-0.6	0.17-0.19	6.6-7.8	0-0	High------	0.28			
	13-32	40-50	1.40-1.50	0.06-0.2	0.14-0.16	6.6-7.8	0-0	High------	0.20			
	32-50	25-35	1.45-1.55	0.2-0.6	0.14-0.16	6.6-7.8	0-0	Moderate	0.28			
	50-72	20-30	1.45-1.55	0.2-0.6	0.14-0.16	7.4-8.4	0-2	Moderate	0.24			
278-------------- Patburn	0-2	30-40	1.45-1.55	0.2-0.6	0.17-0.19	6.1-7.3	0-0	Moderate	0.24	5	6	2-4
	2-24	40-50	1.40-1.50	0.06-0.2	0.14-0.16	6.6-7.8	0-0	High------	0.20			
	24-65	20-30	1.45-1.55	0.2-0.6	0.14-0.16	7.4-8.4	0-2	Moderate	0.24			
279-------------- Pit	0-4	40-60	1.20-1.30	0.06-0.2	0.14-0.16	6.6-7.8	0-2	High------	0.32	5	7	1-4
	4-40	35-60	1.20-1.30	0.06-0.2	0.16-0.19	7.4-8.4	0-4	High------	0.37			
	40-45	30-40	1.35-1.45	0.06-0.2	0.16-0.19	7.4-8.4	0-4	Moderate	0.37			
	45-60	20-27	1.40-1.50	0.2-0.6	0.15-0.17	7.4-8.4	0-4	Low-------	0.43			
280-------------- Pit	0-4	40-60	1.25-1.35	0.06-0.2	0.14-0.16	6.6-7.8	0-0	High------	0.24	5	7	1-4
	4-43	35-60	1.25-1.35	0.06-0.2	0.16-0.19	7.4-8.4	0-4	High------	0.24			
	43-64	20-27	1.35-1.50	0.2-0.6	0.15-0.17	7.4-8.4	0-4	Low-------	0.43			
281:												
Pits.												

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
281:												
Dumps.												
282, 283, 284,												
285-------------- Pittville	0-9	10-18	1.20-1.40	2.0-6.0	0.11-0.13	6.1-7.3	0-0	Low-------	0.32	4	3	2-4
	9-41	20-30	1.40-1.60	0.2-0.6	0.16-0.18	6.1-7.3	0-0	Moderate	0.32			
	41-84	5-15	1.20-1.40	6.0-20	0.07-0.09	6.1-7.3	0-0	Low-------	0.20			
	84-94	---	---	---	---	---	---	----------	----			
286-------------- Ponto	0-8	---	0.50-0.90	2.0-6.0	0.43-0.45	5.6-7.3	0-0	Low-------	0.17	5	2	5-12
	8-45	---	0.50-0.90	2.0-6.0	0.45-0.50	6.1-7.3	0-0	Low-------	0.20			
	45-60	---	0.85-1.00	2.0-6.0	0.35-0.45	6.1-7.3	0-0	Low-------	0.17			
287:												
Ponto-----------	0-6	---	0.50-0.90	2.0-6.0	0.43-0.45	5.6-7.3	0-0	Low-------	0.17	5	2	5-12
	6-62	---	0.50-0.90	2.0-6.0	0.45-0.50	6.1-7.3	0-0	Low-------	0.20			
Neer------------	0-10	---	0.50-0.80	6.0-20	0.38-0.40	5.1-6.5	0-0	Low-------	0.17	2	3	4-15
	10-24	---	0.50-0.80	6.0-20	0.27-0.33	5.1-6.5	0-0	Low-------	0.10			
	24-39	---	1.00-1.20	6.0-20	0.27-0.33	5.1-6.5	0-0	Low-------	0.10			
	39-43	---	---	---	---	---	---	----------	----			
288:												
Ponto-----------	0-8	---	0.50-0.90	2.0-6.0	0.43-0.45	5.6-7.3	0-0	Low-------	0.17	5	2	5-12
	8-45	---	0.50-0.90	2.0-6.0	0.45-0.50	6.1-7.3	0-0	Low-------	0.20			
	45-60	---	0.85-1.00	2.0-6.0	0.35-0.45	6.1-7.3	0-0	Low-------	0.17			
Wyntoon---------	0-9	---	0.95-1.00	2.0-6.0	0.48-0.51	5.6-7.3	0-0	Low-------	0.20	5	2	3-7
	9-25	20-25	1.10-1.30	0.6-2.0	0.16-0.19	5.6-7.3	0-0	Low-------	0.32			
	25-49	30-40	1.20-1.30	0.2-0.6	0.16-0.19	5.6-7.3	0-0	Moderate	0.37			
	49-74	40-50	1.20-1.30	0.06-0.2	0.15-0.17	5.6-7.3	0-0	Moderate	0.28			
289:												
Quaking---------	0-3	---	0.70-0.85	>20	0.21-0.25	5.6-6.5	0-0	Low-------	0.10	5	4	6-9
	3-7	---	0.70-0.85	>20	0.20-0.23	5.6-6.5	0-0	Low-------	0.10			
	7-14	10-18	0.85-0.95	6.0-20	0.07-0.10	6.1-6.5	0-0	Low-------	0.10			
	14-21	18-20	0.85-0.95	2.0-6.0	0.04-0.09	6.1-6.5	0-0	Low-------	0.10			
	21-32	20-27	0.95-1.00	0.2-0.6	0.03-0.07	6.1-6.5	0-0	Low-------	0.10			
	32-64	15-18	1.00-1.20	2.0-6.0	0.02-0.05	6.1-6.5	0-0	Low-------	0.10			
Kephart---------	0-3	3-10	0.80-0.90	>20	0.21-0.25	6.1-6.5	0-0	Low-------	0.05	5	8	2-5
	3-8	1-5	0.80-0.90	>20	0.20-0.23	6.1-6.5	0-0	Low-------	0.02			
	8-19	10-18	0.85-0.90	6.0-20	0.09-0.11	6.1-6.5	0-0	Low-------	0.15			
	19-25	12-20	0.85-0.90	2.0-6.0	0.10-0.12	6.1-6.5	0-0	Low-------	0.15			
	25-68	20-27	0.95-1.20	0.2-0.6	0.14-0.17	6.1-7.3	0-0	Low-------	0.20			
290-------------- Ravendale	0-16	40-60	1.10-1.20	0.06-0.2	0.14-0.16	6.6-7.8	0-0	High------	0.24	4	7	.5-1
	16-36	40-60	1.10-1.30	0.06-0.2	0.14-0.16	7.4-8.4	0-0	High------	0.28			
	36-48	35-60	1.20-1.30	0.06-0.2	0.14-0.16	7.4-8.4	0-4	High------	0.24			
	48-57	15-20	1.30-1.40	2.0-6.0	0.08-0.11	7.4-8.4	0-4	Low-------	0.17			
	57-67	---	---	---	---	---	---	----------	----			
291-------------- Revit	0-20	---	0.85-0.95	2.0-6.0	0.45-0.50	5.1-6.5	0-0	Low-------	0.20	2	2	6-12
	20-30	---	0.85-0.95	2.0-6.0	0.35-0.40	5.1-6.5	0-0	Low-------	0.15			
	30-36	---	0.85-0.95	2.0-6.0	0.25-0.28	6.1-7.3	0-0	Low-------	0.10			
	36-46	---	---	---	---	---	---	----------	----			
292, 293, 294:												
Ricketts--------	0-10	15-20	1.35-1.50	0.6-2.0	0.07-0.10	6.1-7.3	0-0	Low-------	0.10	2	7	1-2
	10-26	25-30	1.35-1.50	0.2-0.6	0.07-0.11	6.1-7.3	0-0	Low-------	0.15			
	26-36	---	---	---	---	---	---	----------	----			

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
292, 293, 294:												
Orhood----------	0-3	10-15	1.40-1.50	0.6-2.0	0.07-0.10	6.6-7.3	0-0	Low-------	0.10	1	7	1-3
	3-8	18-27	1.40-1.55	0.6-2.0	0.07-0.10	6.6-7.3	0-0	Low-------	0.10			
	8-16	18-32	1.40-1.50	0.2-0.6	0.07-0.11	6.6-7.3	0-0	Low-------	0.10			
	16-20	---	---	---	---	---	---	----------	----			
295:												
Ricketts--------	0-5	12-15	1.45-1.60	2.0-6.0	0.11-0.13	6.1-6.5	0-0	Low-------	0.24	3	3	1-2
	5-12	18-20	1.40-1.55	0.6-2.0	0.13-0.16	6.1-6.5	0-0	Low-------	0.28			
	12-22	18-27	1.50-1.60	0.6-2.0	0.07-0.10	6.1-6.5	0-0	Low-------	0.17			
	22-33	18-27	1.50-1.60	0.6-2.0	0.03-0.07	6.1-6.5	0-0	Low-------	0.05			
	33-43	---	---	---	---	---	---	----------	----			
Sweagert--------	0-10	18-27	1.35-1.50	0.6-2.0	0.15-0.17	5.6-6.5	0-0	Low-------	0.32	3	6	1-2
	10-16	27-35	1.30-1.45	0.2-0.6	0.18-0.20	6.1-7.3	0-0	Low-------	0.28			
	16-23	15-18	1.35-1.50	2.0-6.0	0.02-0.05	6.1-7.3	0-0	Low-------	0.05			
	23-35	27-35	1.30-1.50	0.2-0.6	0.18-0.20	6.1-7.3	0-0	Moderate	0.28			
	35-45	---	---	---	---	---	---	----------	----			
296:												
Ricketts--------	0-5	12-15	1.45-1.60	2.0-6.0	0.11-0.13	6.1-6.5	0-0	Low-------	0.24	3	3	1-2
	5-12	18-20	1.40-1.55	0.6-2.0	0.13-0.16	6.1-6.5	0-0	Low-------	0.28			
	12-22	18-27	1.50-1.60	0.6-2.0	0.07-0.10	6.1-6.5	0-0	Low-------	0.17			
	22-33	18-27	1.50-1.60	0.6-2.0	0.03-0.07	6.1-6.5	0-0	Low-------	0.05			
	33-43	---	---	---	---	---	---	----------	----			
Searvar---------	0-6	10-15	1.25-1.35	2.0-6.0	0.13-0.15	6.1-7.3	0-0	Low-------	0.20	3	6	2-6
	6-18	12-18	1.25-1.35	0.6-2.0	0.08-0.11	6.6-7.3	0-0	Low-------	0.10			
	18-28	18-25	1.25-1.35	0.6-2.0	0.08-0.11	6.6-7.3	0-0	Low-------	0.10			
	28-53	---	---	---	---	---	---	----------	----			
	53-63	---	---	---	---	---	---	----------	----			
297-------------- Rivalier	0-4	---	0.50-0.80	2.0-6.0	0.26-0.30	5.6-6.5	0-0	Low-------	0.10	2	4	5-7
	4-27	---	0.80-1.10	2.0-6.0	0.22-0.25	5.6-6.5	0-0	Low-------	0.10			
	27-37	---	---	---	---	---	---	----------	----			
298-------------- Rivalier	0-11	---	0.50-0.80	2.0-6.0	0.26-0.30	5.6-6.5	0-0	Low-------	0.10	2	4	5-7
	11-24	---	0.80-1.10	2.0-6.0	0.22-0.25	5.6-6.5	0-0	Low-------	0.10			
	24-28	---	---	---	---	---	---	----------	----			
299-------------- Rivalier	0-2	---	0.50-0.80	2.0-6.0	0.26-0.30	5.6-6.5	0-0	Low-------	0.10	2	4	5-7
	2-20	---	0.80-1.10	2.0-6.0	0.22-0.25	5.6-6.5	0-0	Low-------	0.10			
	20-24	---	---	---	---	---	---	----------	----			
300-------------- Riverwash	0-6	0-1	---	---	0.01-0.02	---	<2	Low-------	----	---	8	<.1
301:												
Roundbarn-------	0-10	---	0.80-0.90	2.0-6.0	0.13-0.17	6.6-7.3	0-0	Low-------	0.15	4	3	5-10
	10-24	15-20	1.00-1.15	2.0-6.0	0.06-0.10	6.6-7.3	0-0	Low-------	0.10			
	24-41	20-27	1.10-1.20	0.6-2.0	0.07-0.11	6.6-7.3	0-0	Low-------	0.10			
	41-50	15-20	1.15-1.25	2.0-6.0	0.05-0.08	6.6-7.3	0-0	Low-------	0.10			
	50-60	---	---	---	---	---	---	----------	----			
Said------------	0-8	15-20	0.90-1.05	0.6-2.0	0.11-0.14	5.6-6.5	0-0	Low-------	0.20	4	3	2-5
	8-41	20-25	1.10-1.25	0.6-2.0	0.11-0.14	5.6-6.5	0-0	Low-------	0.24			
	41-50	27-35	1.20-1.30	0.2-0.6	0.08-0.12	5.1-6.5	0-0	Low-------	0.15			
	50-54	---	---	---	---	---	---	----------	----			
302:												
Rubble land-----	0-60	0-0	---	---	0.0-0.10	---	0-0	Low-------	----	---	---	0-.1

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
302:												
Argixerolls-----	0-7	10-15	1.30-1.40	2.0-6.0	0.08-0.11	6.1-7.3	0-0	Low-------	0.10	2	4	2-5
	7-15	20-30	1.35-1.40	0.6-2.0	0.07-0.17	6.1-7.3	0-0	Moderate	0.10			
	15-25	25-35	1.40-1.45	0.6-2.0	0.03-0.08	6.1-7.3	0-0	Moderate	0.10			
	25-29	---	---	---	---	---	---	----------	----			
Rock outcrop----	0-60	0-0	---	---	0.0-0.0	---	0-0	----------	----	---	---	0-0
303:												
Rubble land-----	0-60	0-0	---	---	0.0-0.10	---	0-0	Low-------	----	---	---	0-.1
Rock outcrop----	0-60	0-0	---	---	0.0-0.0	---	0-0	----------	----	---	---	0-0
304:												
Rubble land-----	0-60	0-0	---	---	0.0-0.10	---	0-0	Low-------	----	---	---	0-.1
Typic Vitrixerands---	0-3	---	0.50-0.65	2.0-6.0	0.24-0.28	5.6-6.5	0-0	Low-------	0.05	3	4	1-2
	3-6	---	0.50-0.65	2.0-6.0	0.22-0.26	5.6-7.3	0-0	Low-------	0.05			
	6-13	---	0.50-0.75	>20	0.18-0.20	5.6-7.3	0-0	Low-------	0.02			
	13-25	---	0.80-0.85	2.0-6.0	0.21-0.24	5.6-7.3	0-0	Low-------	0.05			
	25-33	---	0.80-0.85	>20	0.15-0.18	5.6-7.3	0-0	Low-------	0.02			
	33-67	---	0.80-0.85	6.0-20	0.13-0.18	6.1-7.3	0-0	Low-------	0.02			
305:												
Rubble land.												
Xerorthents-----	0-3	5-15	1.25-1.40	0.6-2.0	0.07-0.10	5.6-6.5	0-0	Low-------	0.10	3	5	1-2
	3-22	5-15	1.25-1.40	2.0-6.0	0.05-0.08	5.6-7.3	0-0	Low-------	0.10			
	22-34	5-15	1.25-1.40	2.0-6.0	0.05-0.08	5.6-7.3	0-0	Low-------	0.10			
	34-38	---	---	---	---	---	---	----------	----			
306, 307--------- Scarface	0-16	---	0.90-1.00	2.0-6.0	0.40-0.43	6.1-7.3	0-0	Low-------	0.15	5	2	2-6
	16-24	---	0.80-0.90	2.0-6.0	0.18-0.20	6.1-7.3	0-0	Low-------	0.15			
	24-37	---	1.20-1.30	0.2-0.6	0.17-0.19	6.1-7.3	0-0	Low-------	0.15			
	37-52	---	1.20-1.30	0.2-0.6	0.16-0.18	6.1-7.3	0-0	Low-------	0.10			
	52-84	---	1.20-1.30	0.2-0.6	0.14-0.18	6.1-7.3	0-0	Moderate	0.10			
308:												
Scarface--------	0-16	---	0.90-1.00	2.0-6.0	0.40-0.43	6.1-7.3	0-0	Low-------	0.15	5	2	2-6
	16-24	---	0.80-0.90	2.0-6.0	0.18-0.20	6.1-7.3	0-0	Low-------	0.15			
	24-37	---	1.20-1.30	0.2-0.6	0.17-0.19	6.1-7.3	0-0	Low-------	0.15			
	37-52	---	1.20-1.30	0.2-0.6	0.16-0.18	6.1-7.3	0-0	Low-------	0.10			
	52-84	---	1.20-1.30	0.2-0.6	0.14-0.18	6.1-7.3	0-0	Moderate	0.10			
Gasper----------	0-4	---	0.80-0.90	2.0-6.0	0.28-0.30	5.6-6.5	0-0	Low-------	0.20	3	2	3-6
	4-16	15-20	0.90-1.00	2.0-6.0	0.27-0.29	5.6-6.5	0-0	Low-------	0.20			
	16-38	15-20	1.00-1.25	2.0-6.0	0.06-0.12	5.6-6.5	0-0	Low-------	0.10			
	38-60	20-25	1.10-1.30	0.2-0.6	0.11-0.14	5.6-7.3	0-0	Low-------	0.10			
309-------------- Shasta	0-13	---	0.90-1.00	>20	0.37-0.39	5.1-6.0	0-0	Low-------	0.10	4	2	4-10
	13-30	---	0.95-1.10	>20	0.37-0.40	5.1-6.0	0-0	Low-------	0.17			
	30-70	---	1.25-1.40	>20	0.33-0.38	4.5-6.0	0-0	Low-------	0.10			
310-------------- Shastina	0-6	---	0.85-0.95	0.6-2.0	0.36-0.38	5.6-6.5	0-0	Low-------	0.24	3	5	4-7
	6-15	---	1.00-1.40	2.0-6.0	0.24-0.28	5.6-6.5	0-0	Low-------	0.17			
	15-36	---	1.00-1.40	2.0-6.0	0.12-0.18	5.6-6.5	0-0	Low-------	0.15			
	36-60	---	1.00-1.40	>20	0.11-0.15	5.6-6.5	0-0	Low-------	0.10			

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
311:												
Splawn----------	0-3	18-25	1.35-1.50	0.6-2.0	0.06-0.11	6.6-7.3	0-0	Low--------	0.10	2	8	1-3
	3-10	18-27	1.35-1.50	0.6-2.0	0.06-0.11	6.6-7.3	0-0	Low--------	0.10			
	10-17	35-40	1.30-1.45	0.2-0.6	0.07-0.13	6.6-7.3	0-0	Moderate	0.10			
	17-24	35-50	1.25-1.40	0.06-0.2	0.03-0.08	6.6-7.3	0-0	High------	0.10			
	24-34	---	---	---	---	---	---	-----------	----			
Jellico---------	0-5	15-20	1.30-1.50	0.6-2.0	0.09-0.11	6.1-7.3	0-0	Low--------	0.10	2	7	1-3
	5-27	20-27	1.30-1.50	0.6-2.0	0.08-0.10	6.6-7.3	0-0	Low--------	0.10			
	27-33	20-27	1.30-1.50	0.6-2.0	0.05-0.07	6.6-7.3	0-0	Low--------	0.10			
	33-37	---	---	---	---	---	---	-----------	----			
312, 313--------- Stacher	0-2	---	0.30-0.60	6.0-20	0.33-0.36	5.6-6.5	0-0	Low--------	0.10	5	3	8-10
	2-12	---	0.50-0.85	6.0-20	0.31-0.34	5.6-6.5	0-0	Low--------	0.10			
	12-23	20-25	1.00-1.10	0.2-0.6	0.10-0.13	5.6-6.5	0-0	Low--------	0.02			
	23-65	20-25	1.00-1.10	0.2-0.6	0.04-0.08	5.1-6.5	0-0	Low--------	0.02			
	65-69	---	---	---	---	---	---	-----------	----			
314-------------- Stacher	0-4	---	0.30-0.60	6.0-20	0.25-0.29	5.6-6.5	0-0	Low--------	0.05	5	4	8-10
	4-14	---	0.50-0.85	6.0-20	0.31-0.34	5.6-6.5	0-0	Low--------	0.10			
	14-25	20-25	1.00-1.10	0.2-0.6	0.10-0.13	5.6-6.5	0-0	Low--------	0.02			
	25-65	20-25	1.00-1.10	0.2-0.6	0.04-0.08	5.1-6.5	0-0	Low--------	0.02			
	65-75	---	---	---	---	---	---	-----------	----			
315-------------- Stoner	0-6	8-17	1.35-1.50	2.0-6.0	0.07-0.10	5.6-6.5	0-0	Low--------	0.20	5	4	1-4
	6-42	9-18	1.35-1.50	0.6-2.0	0.07-0.11	5.6-6.5	0-0	Low--------	0.24			
	42-74	10-20	1.35-1.50	0.6-2.0	0.06-0.08	5.6-6.5	0-0	Low--------	0.24			
316:												
Stukel gravelly sandy loam-----	0-4	10-15	1.00-1.20	2.0-6.0	0.08-0.10	6.6-7.3	0-0	Low--------	0.20	1	4	1-2
	4-16	10-15	1.00-1.15	2.0-6.0	0.10-0.13	6.6-7.3	0-0	Low--------	0.24			
	16-26	---	---	---	---	---	---	-----------	----			
Stukel very cobbly sandy loam-----------	0-4	10-15	1.00-1.20	2.0-6.0	0.06-0.08	6.6-7.3	0-0	Low--------	0.10	3	8	1-2
	4-11	10-15	1.00-1.20	2.0-6.0	0.10-0.13	6.6-7.8	0-0	Low--------	0.20			
	11-20	10-15	1.00-1.20	2.0-6.0	0.08-0.10	6.6-7.8	0-0	Low--------	0.15			
	20-24	---	---	---	---	---	---	-----------	----			
317-------------- Swanberger	0-17	40-50	1.00-1.20	0.06-0.2	0.15-0.17	6.6-7.8	0-0	High------	0.20	5	4	5-10
	17-52	40-60	1.00-1.20	0.06-0.2	0.15-0.17	7.4-8.4	0-0	High------	0.24			
	52-62	40-60	1.00-1.20	0.06-0.2	0.15-0.17	7.9-8.4	0-0	High------	0.24			
318-------------- Swanberger	0-5	30-35	0.35-0.45	0.6-2.0	0.23-0.25	6.6-7.8	0-0	Low--------	0.02	5	7	20-27
	5-15	40-60	1.00-1.20	0.06-0.2	0.15-0.17	7.4-8.4	0-0	High------	0.24			
	15-41	40-60	1.00-1.20	0.06-0.2	0.15-0.17	7.9-8.4	0-0	High------	0.24			
	41-45	40-60	1.00-1.20	0.06-0.2	0.15-0.17	7.9-9.0	0-2	High------	0.24			
	45-75	35-40	1.00-1.20	0.2-0.6	0.14-0.17	7.9-9.0	0-2	Moderate	0.28			
319-------------- Sweagert	0-7	12-25	1.40-1.55	0.6-2.0	0.14-0.16	6.6-7.3	0-0	Low--------	0.32	2	5	1-4
	7-25	25-35	1.40-1.55	0.2-0.6	0.16-0.19	6.6-7.3	0-0	Moderate	0.28			
	25-35	30-45	1.40-1.60	0.06-0.2	0.15-0.19	6.6-7.3	0-0	High------	0.28			
	35-60	---	---	---	---	7.4-8.4	---	Low--------	0.02			

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
320, 321---------Tionesta	0-5	---	0.90-0.95	>20	0.23-0.26	5.6-6.5	0-0	Low-------	0.05	4	4	6-9
	5-15	---	0.90-0.95	>20	0.20-0.23	6.6-7.3	0-0	Low-------	0.02			
	15-31	---	0.80-0.90	6.0-20	0.25-0.29	6.6-7.3	0-0	Low-------	0.02			
	31-53	---	0.80-0.90	6.0-20	0.17-0.22	6.6-7.3	0-0	Low-------	0.02			
	53-70	---	0.85-0.95	>20	0.14-0.18	6.6-7.3	0-0	Low-------	0.02			
322:												
Trojan----------	0-4	18-25	1.20-1.40	0.6-2.0	0.15-0.17	5.6-6.5	0-0	Low-------	0.32	3	6	1-4
	4-14	18-25	1.20-1.40	0.6-2.0	0.10-0.14	5.6-6.5	0-0	Low-------	0.20			
	14-31	30-35	1.10-1.30	0.2-0.6	0.10-0.15	5.6-6.5	0-0	Moderate	0.20			
	31-48	30-45	1.10-1.30	0.2-0.6	0.07-0.11	5.6-6.5	0-0	Low-------	0.15			
	48-58	---	---	---	---	---	---	----------	----			
Erig------------	0-19	20-27	1.20-1.40	0.6-2.0	0.10-0.14	6.1-7.3	0-0	Low-------	0.24	3	7	2-4
	19-48	27-35	1.20-1.35	0.2-0.6	0.07-0.12	6.1-7.3	0-0	Low-------	0.15			
	48-52	---	---	---	---	---	---	----------	----			
323--------------Twinbuttes	0-3	0-0	0.65-0.70	6.0-20	0.22-0.26	6.1-6.5	0-0	Low-------	0.05	5	8	4-6
	3-7	0-0	0.65-0.70	6.0-20	0.19-0.21	6.6-7.3	0-0	Low-------	0.02			
	7-34	0-0	0.70-0.85	6.0-20	0.18-0.20	6.6-7.3	0-0	Low-------	0.02			
	34-49	0-0	0.70-0.85	>20	0.18-0.20	6.6-7.3	0-0	Low-------	0.02			
	49-72	0-0	0.70-0.85	>20	0.14-0.17	6.6-7.3	0-0	Low-------	0.02			
324:												
Twinbuttes------	0-3	0-0	0.65-0.70	6.0-20	0.22-0.26	6.1-6.5	0-0	Low-------	0.05	5	8	4-6
	3-7	0-0	0.65-0.70	6.0-20	0.19-0.21	6.6-7.3	0-0	Low-------	0.02			
	7-34	0-0	0.70-0.85	6.0-20	0.18-0.20	6.6-7.3	0-0	Low-------	0.02			
	34-49	0-0	0.70-0.85	>20	0.18-0.20	6.6-7.3	0-0	Low-------	0.02			
	49-72	0-0	0.70-0.85	>20	0.14-0.17	6.6-7.3	0-0	Low-------	0.02			
Lava flows------	0-60	0-0	---	---	---	---	0-0	----------	----	---	---	---
325, 326, 327----Wengler	0-4	0-0	0.85-0.90	6.0-20	0.25-0.28	6.1-6.5	0-0	Low-------	0.05	5	5	7-9
	4-12	0-0	0.90-0.95	6.0-20	0.21-0.24	6.1-6.5	0-0	Low-------	0.05			
	12-17	0-0	0.95-1.00	6.0-20	0.19-0.21	6.1-6.5	0-0	Low-------	0.05			
	17-25	0-0	1.00-1.10	>20	0.14-0.17	6.1-6.5	0-0	Low-------	0.02			
	25-47	3-10	1.00-1.10	>20	0.11-0.14	6.1-6.5	0-0	Low-------	0.02			
	47-80	3-10	1.00-1.10	>20	0.13-0.16	6.1-6.5	0-0	Low-------	0.02			
328:												
Whipp-----------	0-1	20-25	1.35-1.50	0.6-2.0	0.16-0.18	6.6-8.4	0-2	Low-------	0.49	2	4	.5-1
	1-3	25-30	1.35-1.50	0.2-0.6	0.10-0.19	7.9-9.0	0-2	Moderate	0.43			
	3-16	40-60	1.25-1.35	0.06-0.20	0.14-0.16	8.5-9.0	0-2	High------	0.32			
	16-22	35-40	1.35-1.40	0.06-0.20	0.16-0.19	8.5-9.0	0-2	Moderate	0.37			
	22-25	0-0	---	---	---	---	0-2	----------	----			
	25-60	10-20	1.50-1.60	2.0-6.0	0.13-0.15	7.4-8.4	0-0	Low-------	0.32			
Cupvar----------	0-21	40-60	1.20-1.30	0.06-0.2	0.14-0.16	6.6-7.8	0-2	High------	0.32	3	7	2-4
	21-25	---	---	---	---	---	---	Low-------	----			
	25-64	10-25	1.35-1.60	2.0-6.0	0.12-0.14	7.4-8.4	0-2	Low-------	0.28			
329:												
Whipp-----------	0-1	20-25	1.35-1.50	0.6-2.0	0.16-0.18	6.6-8.4	0-2	Low-------	0.49	2	4	.5-1
	1-3	25-30	1.35-1.50	0.2-0.6	0.10-0.19	7.9-9.0	0-2	Moderate	0.43			
	3-16	40-60	1.25-1.35	0.06-0.20	0.14-0.16	8.5-9.0	0-2	High------	0.32			
	16-22	35-40	1.35-1.40	0.06-0.20	0.16-0.19	8.5-9.0	0-2	Moderate	0.37			
	22-25	0-0	---	---	---	---	0-2	----------	----			
	25-60	10-20	1.50-1.60	2.0-6.0	0.13-0.15	7.4-8.4	0-0	Low-------	0.32			

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
329:												
Cupvar	0-28	40-60	1.20-1.30	0.06-0.2	0.14-0.16	6.6-7.8	0-2	High	0.32	3	7	2-4
	28-41	---	---	---	---	---	---	Low	----			
	41-60	10-25	1.35-1.60	2.0-6.0	0.12-0.14	7.4-8.4	0-2	Low	0.28			
330 Winnibulli	0-11	18-27	1.35-1.45	0.6-2.0	0.15-0.18	5.6-7.3	0-0	Low	0.32	5	6	2-5
	11-55	27-35	1.35-1.45	0.2-0.6	0.17-0.19	6.1-7.3	0-0	Moderate	0.28			
	55-72	27-35	1.45-1.50	0.06-0.2	0.14-0.16	6.1-7.3	0-0	Moderate	0.28			
	72-87	15-20	1.50-1.60	0.2-0.6	0.10-0.12	6.6-7.3	0-0	Low	0.24			
331 Winnibulli	0-7	18-27	1.35-1.45	0.6-2.0	0.15-0.18	5.6-7.3	0-0	Low	0.32	4	6	2-5
	7-15	27-35	1.35-1.45	0.2-0.6	0.17-0.19	6.1-7.3	0-0	Moderate	0.28			
	15-40	27-35	1.45-1.50	0.06-0.2	0.14-0.16	6.1-7.3	0-0	Moderate	0.28			
	40-50	15-20	1.35-1.45	2.0-6.0	0.10-0.12	6.6-7.3	0-0	Low	0.24			
	50-75	10-15	1.25-1.35	2.0-6.0	0.05-0.06	6.6-7.3	0-0	Low	0.10			
332:												
Winnibulli	0-11	18-27	1.35-1.45	0.6-2.0	0.15-0.18	5.6-7.3	0-0	Low	0.32	5	6	2-5
	11-55	27-35	1.35-1.45	0.2-0.6	0.17-0.19	6.1-7.3	0-0	Moderate	0.28			
	55-72	27-35	1.45-1.50	0.06-0.2	0.14-0.16	6.1-7.3	0-0	Moderate	0.28			
	72-87	15-20	1.50-1.60	0.2-0.6	0.10-0.12	6.6-7.3	0-0	Low	0.24			
Burman	0-8	20-27	1.40-1.50	0.6-2.0	0.15-0.17	6.6-7.3	0-0	Low	0.37	2	6	.5-1
	8-33	35-40	1.35-1.45	0.2-0.6	0.17-0.19	6.6-7.3	0-0	Moderate	0.32			
	33-39	---	---	---	---	---	0-0	----------	----			
	39-72	15-20	1.50-1.60	2.0-6.0	0.12-0.15	6.6-8.4	0-2	Low	0.24			
333, 334:												
Witcher	0-4	---	0.70-0.90	2.0-6.0	0.40-0.43	5.6-6.5	0-0	Low	0.24	4	3	2-9
	4-36	20-35	1.00-1.30	0.2-0.6	0.16-0.19	5.6-6.5	0-0	Low	0.28			
	36-47	27-35	1.25-1.35	0.2-0.6	0.08-0.11	5.6-6.5	0-0	Low	0.10			
	47-57	---	---	---	---	---	---	----------	----			
Gosch	0-3	---	0.80-0.95	2.0-6.0	0.36-0.38	5.6-6.5	0-0	Low	0.20	4	3	4-6
	3-9	---	0.80-0.85	2.0-6.0	0.03-0.07	5.6-6.5	0-0	Low	0.05			
	9-32	20-35	1.00-1.20	0.2-0.6	0.04-0.11	5.6-6.5	0-0	Low	0.05			
	32-50	27-35	1.10-1.20	0.2-0.6	0.10-0.11	5.6-6.5	0-0	Low	0.05			
	50-54	---	---	---	---	---	---	----------	----			
335, 336 Wyntoon	0-9	---	0.95-1.00	2.0-6.0	0.48-0.51	5.6-7.3	0-0	Low	0.20	5	2	3-7
	9-25	20-25	1.10-1.30	0.6-2.0	0.16-0.19	5.6-7.3	0-0	Low	0.32			
	25-49	30-40	1.20-1.30	0.2-0.6	0.16-0.19	5.6-7.3	0-0	Moderate	0.37			
	49-74	40-50	1.20-1.30	0.06-0.2	0.15-0.17	5.6-7.3	0-0	Moderate	0.28			
337:												
Wyntoon	0-9	---	0.95-1.00	2.0-6.0	0.48-0.51	5.6-7.3	0-0	Low	0.20	5	2	3-7
	9-25	20-25	1.10-1.30	0.6-2.0	0.16-0.19	5.6-7.3	0-0	Low	0.32			
	25-49	30-40	1.20-1.30	0.2-0.6	0.16-0.19	5.6-7.3	0-0	Moderate	0.37			
	49-74	40-50	1.20-1.30	0.06-0.2	0.15-0.17	5.6-7.3	0-0	Moderate	0.28			
Depner	0-16	---	0.50-0.90	2.0-6.0	0.39-0.42	5.6-6.5	0-0	Low	0.15	4	3	10-15
	16-37	---	0.70-1.00	2.0-6.0	0.30-0.33	5.1-6.5	0-0	Low	0.10			
	37-48	10-20	0.70-1.00	2.0-6.0	0.28-0.32	5.1-6.5	0-0	Low	0.10			
	48-52	---	---	---	---	---	---	----------	----			

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
338, 339:												
Zeugirdor-------	0-11	---	1.70-2.35	>20	0.0-0.10	---	0-0	Low-------	0.02	5	8	2-3
	11-17	---	0.65-0.85	2.0-6.0	0.18-0.20	6.1-6.5	0-0	Low-------	0.02			
	17-26	---	0.65-0.85	2.0-6.0	0.17-0.19	6.1-6.5	0-0	Low-------	0.05			
	26-47	27-35	1.00-1.20	0.2-0.6	0.06-0.12	5.6-6.5	0-0	Low-------	0.05			
	47-85	27-35	1.25-1.36	0.2-0.6	0.06-0.12	5.6-6.5	0-0	Low-------	0.05			
Goulder---------	0-7	9-12	0.65-0.85	2.0-6.0	0.32-0.36	6.1-7.3	0-0	Low-------	0.10	5	8	2-4
	7-17	12-20	0.65-0.85	2.0-6.0	0.30-0.34	6.1-7.3	0-0	Low-------	0.10			
	17-27	12-20	1.00-1.20	0.6-2.0	0.11-0.14	6.1-7.3	0-0	Low-------	0.20			
	27-41	27-35	1.15-1.25	0.2-0.6	0.08-0.12	5.1-6.0	0-0	Low-------	0.10			
	41-58	27-35	1.25-1.35	0.2-0.6	0.05-0.13	5.1-6.0	0-0	Low-------	0.10			
	58-64	27-35	1.25-1.35	0.2-0.6	0.09-0.13	5.1-6.0	0-0	Low-------	0.05			

Table 17.--Water Features

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
101, 102, 103, 104. Adinot	D	None	---	---	0-1.0	Perched	Dec-Mar
105:							
Adinot	D	None	---	---	0-1.0	Perched	Dec-Mar
Adinot, eroded	D	None	---	---	0-1.0	Perched	Dec-Mar
106:							
Badenaugh	B	None	---	---	>6.0	---	---
Matquaw	B	None	---	---	>6.0	---	---
107:							
Bieber	D	None	---	---	>6.0	---	---
Esperanza	C	None	---	---	>6.0	---	---
108:							
Bieber	D	None	---	---	>6.0	---	---
Modoc	C	None	---	---	>6.0	---	---
109:							
Blankout	A	None	---	---	>6.0	---	---
Medici	A	None	---	---	>6.0	---	---
110:							
Boardburn	B	None	---	---	>6.0	---	---
Hambone	B	None	---	---	>6.0	---	---
111, 112, 113. Bollibokka	D	None	---	---	>6.0	---	---
114, 115, 116. Britton	D	None	---	---	>6.0	---	---
117, 118, 119:							
Bundora	B	None	---	---	>6.0	---	---
Goulder	B	None	---	---	>6.0	---	---
120. Bunselmeier	B	None	---	---	>6.0	---	---
121:							
Burman	C	None	---	---	0-2.5	Perched	Feb-Apr
Lasvar	C	None	---	---	+.5-3.0	Perched	Dec-Jul
122:							
Burney	B	None	---	---	>6.0	---	---
Arkright	B	None	---	---	>6.0	---	---

Table 17.--Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
123, 124:							
Canyoncreek	B	None	---	---	>6.0	---	---
Hermit	B	None	---	---	>6.0	---	---
125, 126, 127 Carberry	B	None	---	---	>6.0	---	---
128, 129:							
Carberry	B	None	---	---	>6.0	---	---
Ponto	B	None	---	---	>6.0	---	---
130:							
Carberry	B	None	---	---	>6.0	---	---
Lava flows	D	None	---	---	>6.0	---	---
131 Chalkford	B	Occasional	Brief	Dec-Apr	3.0-5.0	Apparent	Apr-Jun
132:							
Chatterdown	B	None	---	---	>6.0	---	---
Nikal	B	None	---	---	>6.0	---	---
133:							
Chirpchatter	B	None	---	---	>6.0	---	---
Hunsinger	B	None	---	---	>6.0	---	---
134, 135, 136 Coneward	A	None	---	---	>6.0	---	---
137:							
Coneward	A	None	---	---	>6.0	---	---
Lava flows	D	None	---	---	>6.0	---	---
138 Cupvar	D	Frequent	Long	Dec-Feb	+.5-1.0	Perched	Dec-Feb
139, 140, 141 Danhunt	B	None	---	---	>6.0	---	---
142 Daphnedale	C	None	---	---	>6.0	---	---
143 Datom	D	None	---	---	>6.0	---	---
144 Dekkas	A	None	---	---	>6.0	---	---
145, 146 Depner	B	None	---	---	>6.0	---	---
147, 148, 149 Deven	D	None	---	---	>6.0	---	---
150:							
Dosa	D	None	---	---	0-2.5	Perched	Dec-Jul

Table 17.--Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
150:							
Burman	D	Occasional	Brief	Dec-Mar	+.5-0.5	Perched	Dec-Apr
151 Dotta	B	Occasional	Long	Dec-Apr	3.5-5.0	Apparent	Mar-May
152, 153, 154, 155 Dotta	B	None	---	---	>6.0	---	---
156:							
Dotta	B	None	---	---	>6.0	---	---
Esperanza	C	None	---	---	>6.0	---	---
157:							
Dotta	B	None	---	---	>6.0	---	---
Ricketts	C	None	---	---	>6.0	---	---
158:							
Dotta	B	None	---	---	>6.0	---	---
Searvar	B	None	---	---	>6.0	---	---
159:							
Dudgen	D	None	---	---	+.5-0.5	Perched	Jan-Mar
Graven	C	None	---	---	3.0-4.0	Apparent	Dec-Mar
160:							
Dudgen	D	Occasional	Brief	Dec-Mar	+.5-1.5	Perched	Dec-Mar
Graven	C	Occasional	Brief	Jan-Apr	0.5-3.5	Perched	Dec-Mar
161, 162 Esperanza	C	None	---	---	>6.0	---	---
163 Esro	C	Occasional	Long	Jan-Apr	0-2.0	Apparent	Dec-Aug
164:							
Etsel	D	None	---	---	>6.0	---	---
Neuns	C	None	---	---	>6.0	---	---
165, 166:							
Fiddler	C	None	---	---	>6.0	---	---
Deven	D	None	---	---	>6.0	---	---
167, 168:							
Fiddler	C	None	---	---	>6.0	---	---
Whitinger	C	None	---	---	>6.0	---	---
169:							
Gardens	D	Occasional	Long	Mar-Jun	+1-3.0	Apparent	Apr-Jul
Jacksback	C	Rare	---	---	0-3.0	Apparent	Mar-May

Table 17.--Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
170, 171, 172, 173, 174:							
Gasper	B	None	---	---	>6.0	---	---
Scarface	B	None	---	---	>6.0	---	---
175 Gooval	D	None	---	---	0-2.0	Perched	Feb-Apr
176 Gosch	B	None	---	---	>6.0	---	---
177:							
Gosch	B	None	---	---	>6.0	---	---
Witcher	B	None	---	---	>6.0	---	---
178, 179, 180 Goulder	B	None	---	---	>6.0	---	---
181:							
Gullied land	---	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
Mounthat	B	None	---	---	>6.0	---	---
182, 183:							
Hambone	B	None	---	---	>6.0	---	---
Boardburn	B	None	---	---	>6.0	---	---
184 Henhill	B	Occasional	Long or very long.	Nov-Apr	1.5-5.0	Apparent	Nov-Apr
185 Henhill	B	Occasional	Long or very long.	Nov-Apr	1.5-3.5	Apparent	Nov-Apr
186:							
Hermit	B	None	---	---	>6.0	---	---
Canyoncreek	B	None	---	---	>6.0	---	---
187, 188, 189:							
Hunsinger	B	None	---	---	>6.0	---	---
Chirpchatter	B	None	---	---	>6.0	---	---
190 Jacksback	C	Rare	---	---	0-3.0	Apparent	Mar-May
191, 192 Jadpor	B	None	---	---	>6.0	---	---
193:							
Jahjo	D	None	---	---	>6.0	---	---
Lava flows	D	None	---	---	>6.0	---	---
Loveness	B	None	---	---	>6.0	---	---

Table 17.--Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
194:							
Jellico	C	None	---	---	>6.0	---	---
Lava flows	D	None	---	---	>6.0	---	---
195, 196:							
Jellico	C	None	---	---	>6.0	---	---
Splawn	C	None	---	---	>6.0	---	---
197 Jellycamp	D	None	---	---	>6.0	---	---
198, 199:							
Jellycamp	D	None	---	---	>6.0	---	---
Karcal	D	None	---	---	>6.0	---	---
Longcreek	D	None	---	---	>6.0	---	---
200:							
Jellycamp	D	None	---	---	>6.0	---	---
Lassen	D	None	---	---	>6.0	---	---
Longcreek	D	None	---	---	>6.0	---	---
201:							
Jellycamp	D	None	---	---	>6.0	---	---
Ollierivas	D	None	---	---	>6.0	---	---
202:							
Jellycamp	D	None	---	---	>6.0	---	---
Splawn	C	None	---	---	>6.0	---	---
Ollierivas	D	None	---	---	>6.0	---	---
203:							
Jellycamp	D	None	---	---	>6.0	---	---
Splawn	C	None	---	---	>6.0	---	---
Ricketts	C	None	---	---	>6.0	---	---
204, 205, 206:							
Jellycamp	D	None	---	---	>6.0	---	---
Vansickle	D	None	---	---	>6.0	---	---
207, 208:							
Jimmerson loam	C	None	---	---	>6.0	---	---
Jimmerson stony sandy loam	C	None	---	---	>6.0	---	---
209:							
Jimmerson stony loam	C	None	---	---	>6.0	---	---
Jimmerson loam	C	None	---	---	>6.0	---	---

Table 17.--Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
210:							
Karcal	D	None	---	---	>6.0	---	---
Cuppy	D	None	---	---	>6.0	---	---
211 Keddie	D	Occasional	Brief	Dec-May	+1-1.5	Apparent	Jan-May
212 Keddie	C	Rare	---	---	1.5-5.0	Apparent	Jan-May
213 Keddie	C	Occasional	Brief	Dec-Apr	1.5-3.5	Apparent	Jan-May
214:							
Kephart	B	None	---	---	>6.0	---	---
Quaking	B	None	---	---	>6.0	---	---
215 Kettlebelly	B	None	---	---	>6.0	---	---
216, 217:							
Kettlebelly	C	None	---	---	>6.0	---	---
Neuns	C	None	---	---	>6.0	---	---
218, 219:							
Kettlebelly	B	None	---	---	>6.0	---	---
Neuns	C	None	---	---	>6.0	---	---
220, 221, 222 Kilarc	D	None	---	---	>6.0	---	---
223, 224:							
Kindig	B	None	---	---	>6.0	---	---
Neuns	C	None	---	---	>6.0	---	---
225:							
Lassen	D	None	---	---	>6.0	---	---
Cuppy	D	None	---	---	>6.0	---	---
226 Lasvar	C	None	---	---	+.5-3.0	Perched	Dec-Jul
227:							
Lasvar	C	None	---	---	+.5-3.0	Perched	Dec-Jul
Pitvar	D	None	---	---	+1-1.0	Perched	Dec-Apr
228 Lava flows	D	None	---	---	>6.0	---	---
229:							
Lava flows	D	None	---	---	>6.0	---	---
Gassaway	D	None	---	---	>6.0	---	---

Table 17.--Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
230:							
Lava flows	D	None	---	---	>6.0	---	---
Neer	B	None	---	---	>6.0	---	---
231 Longbell	A	None	---	---	>6.0	---	---
232:							
Longbell	A	None	---	---	>6.0	---	---
Lava flows	D	None	---	---	>6.0	---	---
233:							
Longbilly	D	Occasional	Brief	Dec-Apr	4.0-5.0	Apparent	Dec-Aug
Modoc	C	None	---	---	>6.0	---	---
234:							
Longbilly	D	Occasional	Brief	Dec-Apr	4.0-5.0	Apparent	Dec-Aug
Pit	D	Occasional	Long	Dec-May	5.0-6.0	Apparent	Dec-May
235:							
Longcreek	D	None	---	---	>6.0	---	---
Vansickle	D	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
236:							
Lonkey	C	None	---	---	>6.0	---	---
Datom	D	None	---	---	>6.0	---	---
237, 238, 239:							
Lonkey	C	None	---	---	>6.0	---	---
Malinda	D	None	---	---	>6.0	---	---
240, 241:							
Loveness	B	None	---	---	>6.0	---	---
Fleener	B	None	---	---	>6.0	---	---
242 Lunsford	D	Occasional	Brief	Dec-Apr	1.0-2.0	Apparent	Nov-Apr
243, 244, 245, 246 Malinda	D	None	---	---	>6.0	---	---
247, 248 Matquaw	C	Frequent	Long	Dec-Mar	2.0-3.5	Apparent	Nov-Feb
249:							
Medici	A	None	---	---	>6.0	---	---
Blankout	A	None	---	---	>6.0	---	---
250, 251 Medlake	A	None	---	---	>6.0	---	---

Table 17.--Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
252, 253------------ Modoc	C	None------------	---	---	>6.0	---	---
254:							
Mounthat---------------	B	None------------	---	---	>6.0	---	---
Rock outcrop-----------	D	None------------	---	---	>6.0	---	---
255------------------- Murken	C	None------------	---	---	>6.0	---	---
256------------------- Nanny	B	None------------	---	---	>6.0	---	---
257------------------- Neer	B	None------------	---	---	>6.0	---	---
258, 259, 260:							
Neer-------------------	B	None------------	---	---	>6.0	---	---
Ponto------------------	B	None------------	---	---	>6.0	---	---
261:							
Neuns------------------	C	None------------	---	---	>6.0	---	---
Kettlebelly------------	B	None------------	---	---	>6.0	---	---
262:							
Neuns------------------	C	None------------	---	---	>6.0	---	---
Kettlebelly------------	C	None------------	---	---	>6.0	---	---
263:							
Neuns------------------	C	None------------	---	---	>6.0	---	---
Kindig-----------------	B	None------------	---	---	>6.0	---	---
264:							
Nikal------------------	B	None------------	---	---	>6.0	---	---
Chatterdown------------	B	None------------	---	---	>6.0	---	---
Lava flows-------------	D	None------------	---	---	>6.0	---	---
265------------------- Nosoni	B	Occasional------	Brief---------	Jan-Mar	1.0-2.0	Apparent----	Jan-Apr
266, 267, 268:							
Obie-------------------	B	None------------	---	---	>6.0	---	---
Mounthat---------------	B	None------------	---	---	>6.0	---	---
269------------------- Odas	D	Rare------------	---	---	1.5-3.0	Apparent----	Jan-Dec
270:							
Oxendine---------------	D	None------------	---	---	>6.0	---	---
Lonkey-----------------	C	None------------	---	---	>6.0	---	---
271, 272, 273:							
Oxendine---------------	D	None------------	---	---	>6.0	---	---

Table 17.--Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
271, 272, 273:							
Sweagert	C	None	---	---	>6.0	---	---
274 Pastolla	D	Frequent	Very long	Dec-Apr	0-1.0	Apparent	Oct-Apr
275 Pastolla	D	Frequent	Very long	Jan-Mar	0.5-1.5	Apparent	Dec-Mar
276 Pastolla	D	Occasional	Long	Jan-Mar	1.0-2.0	Apparent	Dec-Mar
277, 278 Patburn	C	Occasional	Long	Jan-May	2.0-5.0	Apparent	Dec-May
279 Pit	D	Frequent	Long	Jan-May	5.0-6.0	Apparent	Dec-May
280 Pit	D	Frequent	Long	Dec-Mar	2.0-3.0	Apparent	Dec-Mar
281:							
Pits.							
Dumps.							
282, 283, 284, 285 Pittville	B	None	---	---	>6.0	---	---
286 Ponto	B	None	---	---	>6.0	---	---
287:							
Ponto	B	None	---	---	>6.0	---	---
Neer	B	None	---	---	>6.0	---	---
288:							
Ponto	B	None	---	---	>6.0	---	---
Wyntoon	B	None	---	---	>6.0	---	---
289:							
Quaking	B	None	---	---	>6.0	---	---
Kephart	B	None	---	---	>6.0	---	---
290 Ravendale	D	None	---	---	+1.-1.0	Perched	Jan-May
291 Revit	C	None	---	---	>6.0	---	---
292, 293, 294:							
Ricketts	C	None	---	---	>6.0	---	---
Orhood	D	None	---	---	>6.0	---	---
295:							
Ricketts	B	None	---	---	>6.0	---	---
Sweagert	B	None	---	---	+.5-3.0	Perched	Dec-Apr

Table 17.--Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
296:							
Ricketts	B	None	---	---	>6.0	---	---
Searvar	B	None	---	---	>6.0	---	---
297, 298, 299 Rivalier	B	None	---	---	>6.0	---	---
300 Riverwash	D	Frequent	Long or very long.	Oct-Jul	0-2.0	Apparent	Jan-Dec
301:							
Roundbarn	B	None	---	---	>6.0	---	---
Said	B	None	---	---	>6.0	---	---
302:							
Rubble land	A	None	---	---	>6.0	---	---
Argixerolls	C	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
303:							
Rubble land	A	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
304:							
Rubble land	A	None	---	---	>6.0	---	---
Typic Vitrixerands	A	None	---	---	>6.0	---	---
305:							
Rubble land	A	None	---	---	>6.0	---	---
Xerorthents	A	None	---	---	>6.0	---	---
306, 307 Scarface	B	None	---	---	>6.0	---	---
308:							
Scarface	B	None	---	---	>6.0	---	---
Gasper	B	None	---	---	>6.0	---	---
309 Shasta	B	None	---	---	>6.0	---	---
310 Shastina	B	None	---	---	>6.0	---	---
311:							
Splawn	C	None	---	---	>6.0	---	---
Jellico	C	None	---	---	>6.0	---	---
312, 313, 314 Stacher	B	None	---	---	>6.0	---	---
315 Stoner	B	None	---	---	>6.0	---	---

Table 17.--Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
316:							
Stukel gravelly sandy loam	D	None	---	---	>6.0	---	---
Stukel very cobbly sandy loam	B	None	---	---	>6.0	---	---
317, 318 Swanberger	D	None	---	---	+4-0	Perched	Feb-Jun
319 Sweagert	C	None	---	---	>6.0	---	---
320, 321 Tionesta	A	None	---	---	>6.0	---	---
322:							
Trojan	B	None	---	---	>6.0	---	---
Erig	B	None	---	---	>6.0	---	---
323 Twinbuttes	A	None	---	---	>6.0	---	---
324:							
Twinbuttes	A	None	---	---	>6.0	---	---
Lava flows	D	None	---	---	>6.0	---	---
325, 326, 327 Wengler	A	None	---	---	>6.0	---	---
328, 329:							
Whipp	D	None	---	---	0-2.0	Perched	Nov-Apr
Cupvar	D	Frequent	Long	Dec-Feb	+.5-1.0	Perched	Dec-Feb
330 Winnibulli	C	Occasional	Long	Jan-Apr	1.5-3.5	Apparent	Dec-Apr
331 Winnibulli	C	Occasional	Long	Jan-Apr	2.0-4.0	Apparent	Dec-Apr
332:							
Winnibulli	C	Occasional	Long	Jan-Apr	1.5-3.5	Apparent	Dec-Apr
Burman	D	None	---	---	+.5-0.5	Perched	Jan-Mar
333, 334:							
Witcher	B	None	---	---	>6.0	---	---
Gosch	B	None	---	---	>6.0	---	---
335, 336 Wyntoon	B	None	---	---	>6.0	---	---
337:							
Wyntoon	B	None	---	---	>6.0	---	---
Depner	B	None	---	---	>6.0	---	---

Table 17.--Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
338, 339:							
Zeugirdor	B	None	---	---	>6.0	---	---
Goulder	B	None	---	---	>6.0	---	---

Table 18.--Soil Features

(The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
	In		In				
101, 102, 103, 104------ Adinot	14-20	Hard-----	---	---	Moderate	Moderate	Low.
105:							
Adinot-----------------	14-20	Hard-----	---	---	Moderate	Moderate	Low.
Adinot, eroded---------	4-10	Hard-----	---	---	Moderate	Low------	Low.
106:							
Badenaugh--------------	>60	---	---	---	Moderate	Moderate	Moderate.
Matquaw----------------	>60	---	---	---	Moderate	Moderate	Low.
107:							
Bieber-----------------	>60	---	8-20	Thick----	Low------	High-----	Low.
Esperanza--------------	>60	---	40-60	Thin-----	Moderate	High-----	Low.
108:							
Bieber-----------------	>60	---	8-20	Thick----	Low------	High-----	Low.
Modoc------------------	>60	---	20-40	Thick----	Moderate	High-----	Low.
109:							
Blankout---------------	>60	---	---	---	Low------	Low------	Low.
Medici-----------------	>60	---	---	---	Moderate	Moderate	Moderate.
110:							
Boardburn--------------	40-60	Soft-----	---	---	Moderate	Moderate	Low.
Hambone----------------	40-60	Soft-----	---	---	Moderate	Moderate	Low.
111, 112, 113----------- Bollibokka	10-20	Hard-----	---	---	Moderate	Moderate	Low.
114, 115, 116----------- Britton	10-20	Soft-----	---	---	High-----	Moderate	Moderate.
117, 118, 119:							
Bundora----------------	>60	---	---	---	High-----	Moderate	Low.
Goulder----------------	40-80	Soft-----	---	---	Moderate	Low------	Moderate.
120--------------------- Bunselmeier	>60	---	---	---	Moderate	Moderate	Low.
121:							
Burman-----------------	>60	---	20-40	Thick----	Low------	High-----	Low.
Lasvar-----------------	>60	---	20-40	Thick----	Moderate	High-----	Low.
122:							
Burney-----------------	40-60	Soft-----	---	---	Low------	Moderate	Moderate.
Arkright---------------	20-40	Soft-----	---	---	Moderate	Moderate	Moderate.
123, 124:							
Canyoncreek------------	40-60	Soft-----	---	---	Moderate	Moderate	Moderate.

Table 18.--Soil Features--Continued

Soil name and map symbol	Bedrock: Depth	Bedrock: Hardness	Cemented pan: Depth	Cemented pan: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
	In		In				
123, 124:							
Hermit	40-60	Soft	---	---	Moderate	Moderate	Moderate.
125, 126, 127 Carberry	40-60	Hard	---	---	Moderate	Low	Moderate.
128, 129:							
Carberry	40-60	Hard	---	---	Moderate	Low	Moderate.
Ponto	>60	---	---	---	Moderate	High	High.
130:							
Carberry	40-60	Hard	---	---	Moderate	Low	Moderate.
Lava flows	0	Hard	---	---	None	---	---
131 Chalkford	>60	---	---	---	Moderate	High	Low.
132:							
Chatterdown	>60	---	---	---	High	High	High.
Nikal	20-40	Hard	---	---	High	Moderate	Moderate.
133:							
Chirpchatter	>60	---	---	---	Moderate	Moderate	Low.
Hunsinger	40-60	Soft	---	---	Moderate	Moderate	Low.
134, 135, 136 Coneward	>60	---	40-60	Thin	Low	Moderate	Low.
137:							
Coneward	>60	---	40-60	Thin	Low	Moderate	Low.
Lava flows	0	Hard	---	---	None	---	---
138 Cupvar	>60	---	20-40	Thin	Low	High	Low.
139, 140, 141 Danhunt	>60	---	---	---	Moderate	Low	Moderate.
142 Daphnedale	20-40	Soft	---	---	Moderate	High	Low.
143 Datom	10-20	Soft	---	---	High	Low	Low.
144 Dekkas	>60	---	---	---	High	Low	Moderate.
145, 146 Depner	40-60	Soft	---	---	Moderate	Low	Moderate.
147, 148, 149 Deven	10-20	Hard	---	---	Low	High	Low.
150:							
Dosa	20-40	Soft	---	---	Moderate	High	Low.
Burman	>60	---	20-40	Thin	Moderate	High	Low.

Table 18.--Soil Features--Continued

Soil name and map symbol	Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
	In		In				
151-------------------- Dotta	>60	---	---	---	None-----	Moderate	Moderate.
152, 153, 154, 155------ Dotta	>60	---	---	---	Moderate	Moderate	Moderate.
156:							
Dotta------------------	>60	---	---	---	Moderate	Moderate	Moderate.
Esperanza--------------	>60	---	40-60	Thin-----	Moderate	High-----	Low.
157:							
Dotta------------------	>60	---	---	---	Moderate	Moderate	Moderate.
Ricketts---------------	20-40	Hard-----	---	---	Moderate	Moderate	Low.
158:							
Dotta------------------	>60	---	---	---	Moderate	Moderate	Moderate.
Searvar----------------	20-40	Soft-----	---	---	Moderate	Moderate	Low.
159:							
Dudgen-----------------	>60	---	10-20	Thin-----	Moderate	High-----	Low.
Graven-----------------	>60	---	20-40	Thin-----	Moderate	High-----	Low.
160:							
Dudgen-----------------	>60	---	10-20	Thin-----	Moderate	High-----	Low.
Graven-----------------	>60	---	20-40	Thin-----	Moderate	High-----	Low.
161, 162---------------- Esperanza	>60	---	40-60	Thin-----	Moderate	High-----	Low.
163-------------------- Esro	>60	---	---	---	High-----	High-----	Low.
164:							
Etsel------------------	4-14	Hard-----	---	---	Low------	Moderate	Moderate.
Neuns------------------	20-40	Hard-----	---	---	Low------	Moderate	Moderate.
165, 166:							
Fiddler----------------	20-40	Hard-----	---	---	Low------	High-----	Low.
Deven------------------	10-20	Hard-----	---	---	Low------	High-----	Low.
167, 168:							
Fiddler----------------	20-40	Hard-----	---	---	Low------	High-----	Low.
Whitinger--------------	20-40	Hard-----	---	---	Moderate	Moderate	Low.
169:							
Gardens----------------	>60	---	15-45	Thin-----	High-----	High-----	Moderate.
Jacksback--------------	>60	---	---	---	High-----	High-----	Moderate.
170, 171, 172, 173, 174:							
Gasper-----------------	>60	---	---	---	Moderate	Moderate	Moderate.
Scarface---------------	>60	---	---	---	Moderate	High-----	Moderate.

Table 18.--Soil Features--Continued

Soil name and map symbol	Bedrock: Depth	Bedrock: Hardness	Cemented pan: Depth	Cemented pan: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
	In		In				
175 Gooval	20-40	Soft	---	---	Low	High	Low.
176 Gosch	40-60	Soft	---	---	Moderate	Moderate	Moderate.
177:							
Gosch	40-60	Soft	---	---	Moderate	Moderate	Moderate.
Witcher	40-60	Soft	---	---	Moderate	Moderate	Moderate.
178, 179, 180 Goulder	40-80	Soft	---	---	Moderate	Low	Moderate.
181:							
Gullied land	>60	---	---	---	None	---	---
Rock outcrop	0	Hard	---	---	---	---	---
Mounthat	20-40	Soft	---	---	Low	Low	Low.
182, 183:							
Hambone	40-60	Soft	---	---	Moderate	Moderate	Low.
Boardburn	40-60	Soft	---	---	Moderate	Moderate	Low.
184, 185 Henhill	>60	---	---	---	High	High	Low.
186:							
Hermit	40-60	Soft	---	---	Moderate	Moderate	Moderate.
Canyoncreek	40-60	Soft	---	---	Moderate	Moderate	Moderate.
187, 188, 189:							
Hunsinger	40-60	Soft	---	---	Moderate	Moderate	Low.
Chirpchatter	>60	---	---	---	Moderate	Moderate	Low.
190 Jacksback	>60	---	---	---	High	High	Moderate.
191, 192 Jadpor	>60	---	---	---	Low	Low	Low.
193:							
Jahjo	4-14	Hard	---	---	High	Low	Low.
Lava flows	0	Hard	---	---	None	---	---
Loveness	>60	---	---	---	Moderate	Moderate	Low.
194:							
Jellico	20-40	Hard	---	---	Moderate	Moderate	Low.
Lava flows	0	Hard	---	---	None	---	---
195, 196:							
Jellico	20-40	Hard	---	---	Moderate	Moderate	Low.
Splawn	20-40	Hard	---	---	Moderate	Moderate	Low.

Table 18.--Soil Features--Continued

Soil name and map symbol	Bedrock Depth	Bedrock Hardness	Cemented pan Depth	Cemented pan Hardness	Potential frost action	Risk of corrosion Uncoated steel	Risk of corrosion Concrete
	In		In				
197: Jellycamp	15-35	Hard	10-20	Thick	Moderate	Moderate	Low.
198, 199:							
Jellycamp	12-20	Hard	10-20	Thick	Moderate	Moderate	Low.
Karcal	20-30	Hard	---	---	Moderate	High	Low.
Longcreek	14-20	Hard	---	---	Low	Moderate	Low.
200:							
Jellycamp	12-20	Hard	10-20	Thick	Moderate	Moderate	Low.
Lassen	20-40	Hard	---	---	Moderate	High	Low.
Longcreek	14-20	Hard	---	---	Low	Moderate	Low.
201:							
Jellycamp	12-20	Hard	10-20	Thick	Moderate	Moderate	Low.
Ollierivas	30-50	Hard	20-40	Thick	Moderate	High	Low.
202:							
Jellycamp	12-20	Hard	10-20	Thick	Moderate	Moderate	Low.
Splawn	20-40	Hard	---	---	Moderate	Moderate	Low.
Ollierivas	30-50	Hard	20-40	Thick	Moderate	High	Low.
203:							
Jellycamp	15-35	Hard	10-20	Thick	High	Moderate	Low.
Splawn	20-40	Hard	---	---	Moderate	Moderate	Low.
Ricketts	20-40	Hard	---	---	Moderate	Moderate	Low.
204, 205, 206:							
Jellycamp	12-20	Hard	10-20	Thick	Moderate	Moderate	Low.
Vansickle	11-30	Hard	10-20	Thin	Moderate	Moderate	Low.
207, 208:							
Jimmerson loam	>60	---	---	---	Moderate	Moderate	Moderate.
Jimmerson stony sandy loam	>60	---	---	---	Moderate	Moderate	Moderate.
209:							
Jimmerson stony loam	>60	---	---	---	Moderate	Moderate	Moderate.
Jimmerson loam	>60	---	---	---	Moderate	Moderate	Moderate.
210:							
Karcal	20-30	Hard	---	---	Moderate	High	Low.
Cuppy	21-40	Hard	20-38	Thin	Moderate	High	Low.
211: Keddie	>60	---	---	---	None	Moderate	Low.
212: Keddie	>60	---	---	---	Moderate	Moderate	Low.

Table 18.--Soil Features--Continued

Soil name and map symbol	Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
	In		In				
213 Keddie	>60	---	---	---	Moderate	Moderate	Low.
214:							
Kephart	>60	---	---	---	High	Low	Moderate.
Quaking	>60	---	---	---	Moderate	Low	Moderate.
215 Kettlebelly	>60	Soft	---	---	Moderate	Moderate	Moderate.
216, 217:							
Kettlebelly	>60	---	---	---	Moderate	Low	Moderate.
Neuns	20-40	Hard	---	---	Low	Moderate	Moderate.
218, 219:							
Kettlebelly	>60	Soft	---	---	Moderate	Moderate	Moderate.
Neuns	20-40	Hard	---	---	Low	Moderate	Moderate.
220, 221, 222 Kilarc	40-60	Soft	---	---	Moderate	High	High.
223, 224:							
Kindig	40-60	Soft	---	---	Low	Moderate	Moderate.
Neuns	20-40	Hard	---	---	Low	Moderate	Moderate.
225:							
Lassen	20-40	Hard	---	---	Moderate	High	Low.
Cuppy	21-40	Hard	20-38	Thin	Moderate	High	Low.
226 Lasvar	>60	---	20-40	Thick	Moderate	High	Low.
227:							
Lasvar	>60	---	20-40	Thick	Moderate	High	Low.
Pitvar	>60	---	50-60	Thick	High	High	Low.
228 Lava flows	0	Hard	---	---	None	---	---
229:							
Lava flows	0	Hard	---	---	None	---	---
Gassaway	11-14	Hard	---	---	Moderate	Moderate	Low.
230:							
Lava flows	0	Hard	---	---	None	---	---
Neer	20-40	Hard	---	---	Low	Moderate	Moderate.
231 Longbell	>60	---	---	---	Moderate	Low	Moderate.
232:							
Longbell	>60	---	---	---	Moderate	Low	Moderate.
Lava flows	0	Hard	---	---	None	---	---

Table 18.--Soil Features--Continued

Soil name and map symbol	Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
	In		In				
233:							
Longbilly	>60	---	---	---	High	High	High.
Modoc	>60	---	20-40	Thick	Moderate	High	Low.
234:							
Longbilly	>60	---	---	---	High	High	High.
Pit	>60	---	---	---	High	High	Low.
235:							
Longcreek	14-20	Hard	---	---	Low	Moderate	Low.
Vansickle	11-30	Hard	10-20	Thin	Moderate	Moderate	Low.
Rock outcrop	0	Hard	---	---	---	---	---
236:							
Lonkey	20-40	Soft	---	---	Low	Moderate	Low.
Datom	10-20	Soft	---	---	High	Low	Low.
237, 238, 239:							
Lonkey	20-40	Hard	---	---	Moderate	High	Low.
Malinda	14-20	Hard	---	---	Moderate	Moderate	Low.
240, 241:							
Loveness	>60	---	---	---	Moderate	Moderate	Low.
Fleener	>60	---	---	---	Moderate	Low	Low.
242 Lunsford	>60	---	---	---	High	High	Low.
243, 244, 245, 246 Malinda	14-20	Hard	---	---	Moderate	Moderate	Low.
247, 248 Matquaw	>60	---	---	---	Moderate	Moderate	Moderate.
249:							
Medici	>60	---	---	---	Moderate	Moderate	Moderate.
Blankout	>60	---	---	---	Low	Low	Low.
250, 251 Medlake	>60	---	---	---	Moderate	Low	Moderate.
252, 253 Modoc	>60	---	20-40	Thick	Moderate	High	Low.
254:							
Mounthat	20-40	Soft	---	---	Low	Low	Low.
Rock outcrop	0	Hard	---	---	---	---	---
255 Murken	20-40	Hard	---	---	Moderate	Moderate	Low.
256 Nanny	>60	---	---	---	Low	High	High.

Table 18.--Soil Features--Continued

Soil name and map symbol	Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
	In		In				
257-----Neer	20-40	Soft-----	---	---	Low------	Moderate	Moderate.
258, 259, 260:							
Neer-----	20-40	Soft-----	---	---	Low------	Moderate	Moderate.
Ponto-----	>60	---	---	---	Moderate	High-----	High.
261:							
Neuns-----	20-40	Hard-----	---	---	Low------	Moderate	Moderate.
Kettlebelly-----	>60	Soft-----	---	---	Moderate	Moderate	Moderate.
262:							
Neuns-----	20-40	Hard-----	---	---	Low------	Moderate	Moderate.
Kettlebelly-----	>60	---	---	---	Moderate	Low------	Moderate.
263:							
Neuns-----	20-40	Hard-----	---	---	Low------	Moderate	Moderate.
Kindig-----	40-60	Soft-----	---	---	Low------	Moderate	Moderate.
264:							
Nikal-----	20-40	Hard-----	---	---	High-----	Moderate	Moderate.
Chatterdown-----	>60	---	---	---	High-----	High-----	High.
Lava flows-----	0	Hard-----	---	---	None-----	---	---
265-----Nosoni	>60	---	---	---	Moderate	Moderate	Low.
266, 267, 268:							
Obie-----	40-60	Soft-----	---	---	Low------	High-----	High.
Mounthat-----	20-40	Soft-----	---	---	Low------	Low------	Low.
269-----Odas	>60	---	---	---	High-----	Moderate	Moderate.
270:							
Oxendine-----	10-20	Soft-----	9-20	Thin-----	Moderate	High-----	Low.
Lonkey-----	20-40	Soft-----	---	---	Low------	Moderate	Low.
271, 272, 273:							
Oxendine-----	20-39	Soft-----	10-14	Thick----	Moderate	Moderate	Low.
Sweagert-----	>60	---	20-40	Thick----	Moderate	Low------	Low.
274, 275-----Pastolla	>60	---	---	---	High-----	High-----	Low.
276-----Pastolla	>60	---	---	---	High-----	High-----	Low.
277, 278-----Patburn	>60	---	---	---	Moderate	Moderate	Low.
279, 280-----Pit	>60	---	---	---	High-----	High-----	Low.

Table 18.--Soil Features--Continued

Soil name and map symbol	Bedrock Depth	Bedrock Hardness	Cemented pan Depth	Cemented pan Hardness	Potential frost action	Risk of corrosion Uncoated steel	Risk of corrosion Concrete
	In		In				
281:							
Pits.							
Dumps.							
282, 283, 284, 285: Pittville	>60	---	60-99	Thin	Moderate	Moderate	Low.
286: Ponto	>60	---	---	---	Moderate	High	High.
287:							
Ponto	>60	---	---	---	Moderate	High	High.
Neer	20-40	Soft	---	---	Low	Moderate	Moderate.
288:							
Ponto	>60	---	---	---	Moderate	High	High.
Wyntoon	>60	---	---	---	Moderate	Moderate	Moderate.
289:							
Quaking	>60	---	---	---	Moderate	Low	Moderate.
Kephart	>60	---	---	---	High	Low	Moderate.
290: Ravendale	40-60	Soft	---	---	Moderate	High	Low.
291: Revit	20-40	Hard	---	---	High	Moderate	Moderate.
292, 293, 294:							
Ricketts	20-40	Hard	---	---	Moderate	Moderate	Low.
Orhood	14-20	Hard	---	---	Moderate	Moderate	Low.
295:							
Ricketts	20-40	Soft	---	---	Moderate	Low	Low.
Sweagert	20-40	Soft	---	---	Moderate	Low	Moderate.
296:							
Ricketts	20-40	Soft	---	---	Moderate	Low	Low.
Searvar	20-40	Soft	---	---	Moderate	Moderate	Low.
297, 298, 299: Rivalier	20-40	Hard	---	---	Moderate	Moderate	Moderate.
300: Riverwash	>60	---	---	---	---	---	---
301:							
Roundbarn	40-60	Soft	---	---	Moderate	Moderate	Low.
Said	40-60	Soft	---	---	Moderate	Moderate	Moderate.
302:							
Rubble land	0	Hard	---	---	Low	Low	Low.
Argixerolls	10-40	Hard	---	---	Low	Moderate	Low.

Table 18.--Soil Features--Continued

Soil name and map symbol	Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
	In		In				
302:							
Rock outcrop	0	Hard	---	---	---	---	---
303:							
Rubble land	0	Hard	---	---	Low	Low	Low.
Rock outcrop	0	Hard	---	---	---	---	---
304:							
Rubble land	0	Hard	---	---	Low	Low	Low.
Typic Vitrixerands	20-90	Hard	---	---	Moderate	Low	Moderate.
305:							
Rubble land	0	Hard	---	---	Low	Low	Low.
Xerorthents	20-40	Soft	---	---	Moderate	Low	Low.
306, 307 Scarface	>60	---	---	---	Moderate	High	Moderate.
308:							
Scarface	>60	---	---	---	Moderate	High	Moderate.
Gasper	>60	---	---	---	Moderate	Moderate	Moderate.
309 Shasta	>60	---	---	---	Low	Moderate	Moderate.
310 Shastina	>60	---	---	---	High	Moderate	Moderate.
311:							
Splawn	20-40	Hard	---	---	Moderate	Moderate	Low.
Jellico	20-40	Hard	---	---	Moderate	Moderate	Low.
312, 313, 314 Stacher	>60	---	---	---	Moderate	Low	High.
315 Stoner	>60	---	---	---	Moderate	Moderate	Moderate.
316:							
Stukel gravelly sandy loam	10-20	Hard	---	---	High	Moderate	Low.
Stukel very cobbly sandy loam	10-20	Soft	---	---	Low	Moderate	Low.
317, 318 Swanberger	>60	---	60-99	Thick	High	High	Low.
319 Sweagert	>60	---	20-40	Thick	Moderate	Low	Low.
320, 321 Tionesta	>60	---	---	---	Moderate	Low	Moderate.
322:							
Trojan	40-60	Hard	---	---	Moderate	Moderate	Low.
Erig	40-60	Hard	---	---	Moderate	Moderate	Low.

Table 18.--Soil Features--Continued

Soil name and map symbol	Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
	In		In				
323------------------------ Twinbuttes	>60	---	---	---	Moderate	Low------	Moderate.
324:							
Twinbuttes-------------	>60	---	---	---	Moderate	Low------	Moderate.
Lava flows-------------	0	Hard-----	---	---	None-----	---	---
325, 326, 327----------- Wengler	>60	Hard-----	---	---	Moderate	Low------	Moderate.
328, 329:							
Whipp------------------	>60	---	20-40	Thin-----	High-----	High-----	Moderate.
Cupvar-----------------	>60	---	20-40	Thin-----	Low------	High-----	Low.
330-------------------- Winnibulli	>60	---	60-80	Thin-----	Moderate	Moderate	Moderate.
331-------------------- Winnibulli	>60	---	---	---	Moderate	Moderate	Moderate.
332:							
Winnibulli-------------	>60	---	60-80	Thin-----	Moderate	Moderate	Moderate.
Burman-----------------	>60	---	20-40	Thin-----	Moderate	High-----	Low.
333, 334:							
Witcher----------------	40-60	Soft-----	---	---	Moderate	Moderate	Moderate.
Gosch------------------	40-60	Soft-----	---	---	Moderate	Moderate	Moderate.
335, 336---------------- Wyntoon	>60	---	---	---	Moderate	Moderate	Moderate.
337:							
Wyntoon----------------	>60	---	---	---	Moderate	Moderate	Moderate.
Depner-----------------	40-60	Soft-----	---	---	Moderate	Low------	Moderate.
338, 339:							
Zeugirdor--------------	>60	---	---	---	Moderate	Low------	Moderate.
Goulder----------------	40-80	Soft-----	---	---	Moderate	Low------	Moderate.

Table 19.--Classification of the Soils

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Adinot	Loamy, mixed, superactive, mesic Lithic Argixerolls
Argixerolls	Argixerolls
Arkright	Fine-loamy, parasesquic, mesic Ultic Haploxeralfs
Badenaugh	Loamy-skeletal, mixed, superactive, mesic Aridic Argixerolls
Bieber	Clayey, smectitic, mesic, shallow Argiduridic Durixerolls
Blankout	Medial over loamy, mixed, superactive, frigid Typic Haploxerands
Boardburn	Fine-loamy, mixed, superactive, mesic Ultic Haploxeralfs
Bollibokka	Loamy, mixed, superactive, mesic Lithic Ultic Argixerolls
Britton	Clayey, mixed, superactive, mesic, shallow Vitrandic Xerochrepts
Bundora	Medial over loamy-skeletal, mixed, superactive, frigid Alfic Humic Haploxerands
Bunselmeier	Loamy-skeletal, mixed, superactive, mesic Vitrandic Argixerolls
*Burman	Fine, smectitic, mesic Argic Duraquolls
Burney	Fine-loamy, parasesquic, mesic Ultic Haploxeralfs
Canyoncreek	Medial over loamy-skeletal, mixed, superactive Xeric Haplocryands
*Carberry	Medial-skeletal, mixed, frigid Typic Haploxerands
Chalkford	Fine-loamy, mixed, superactive, mesic Pachic Haploxerolls
Chatterdown	Medial over loamy, mixed, superactive, mesic Humic Haploxerands
Chirpchatter	Fine-loamy, mixed, superactive, mesic Ultic Argixerolls
Coneward	Mixed, mesic Typic Xeropsamments
Cuppy	Fine, smectitic, mesic Chromic Durixererts
Cupvar	Fine, smectitic, mesic Haplic Durixererts
Danhunt	Medial-skeletal, mixed, frigid Typic Vitrixerands
Daphnedale	Fine, smectitic, mesic Typic Argixerolls
Datom	Clayey, mixed, superactive, mesic, shallow Vitrandic Argixerolls
Dekkas	Ashy, frigid Typic Vitrixerands
Depner	Medial-skeletal, mixed, mesic Typic Haploxerands
Deven	Clayey, smectitic, mesic Lithic Argixerolls
Dosa	Fine, smectitic, mesic Xeric Epiaquerts
Dotta	Fine-loamy, mixed, superactive, mesic Pachic Argixerolls
Dudgen	Clayey, smectitic, mesic, shallow Typic Durixeralfs
Erig	Loamy-skeletal, mixed, superactive, frigid Pachic Argixerolls
Esperanza	Fine, smectitic, mesic Pachic Argixerolls
Esro	Fine-silty, mixed, superactive, frigid Aquandic Endoaquolls
Etsel	Loamy-skeletal, mixed, active, nonacid, mesic Lithic Xerorthents
Fiddler	Clayey-skeletal, smectitic, mesic Typic Argixerolls
Fleener	Loamy-skeletal, mixed, superactive, mesic Andic Argixerolls
Gardens	Fine-loamy, mixed, superactive, frigid Udollic Endoaqualfs
Gasper	Loamy-skeletal, mixed, superactive, mesic Andic Haploxeralfs
Gassaway	Loamy, mixed, superactive, mesic Lithic Xerochrepts
Gooval	Clayey-skeletal, mixed, superactive, mesic Ultic Argixerolls
Gosch	Loamy-skeletal, mixed, superactive, frigid Andic Haploxeralfs
Goulder	Medial over loamy-skeletal, mixed, superactive, frigid Ultic Haploxerands
Graven	Fine, smectitic, mesic Typic Durixerolls
Hambone	Loamy-skeletal, mixed, superactive, mesic Ultic Haploxeralfs
Henhill	Fine-loamy, mixed, superactive, mesic Pachic Argixerolls
Hermit	Medial over loamy, mixed, superactive Xeric Haplocryands
Hunsinger	Loamy-skeletal, mixed, superactive, mesic Ultic Argixerolls
Jacksback	Fine-loamy, mixed, superactive, frigid Aquultic Haploxerolls
Jadpor	Loamy-skeletal, mixed, superactive, mesic Pachic Argixerolls
Jahjo	Loamy, mixed, superactive, mesic Lithic Xerumbrepts
Jellico	Loamy-skeletal, mixed, superactive, mesic Ultic Argixerolls
Jellycamp	Clayey, smectitic, mesic, shallow Abruptic Argiduridic Durixerolls
Jimmerson	Fine-loamy, mixed, superactive, mesic Vitrandic Palexeralfs
Karcal	Fine, smectitic, mesic Leptic Haploxererts
Keddie	Fine-loamy, mixed, superactive, mesic Cumulic Endoaquolls
Kephart	Fine-loamy, mixed, superactive, mesic Vitrandic Haploxeralfs
Kettlebelly	Clayey, parasesquic, mesic Xeric Palehumults
Kilarc	Fine, mixed, superactive, mesic Mollic Palexeralfs
Kindig	Loamy-skeletal, mixed, active, mesic Dystric Xerochrepts

Table 19.--Classification of the Soils--Continued

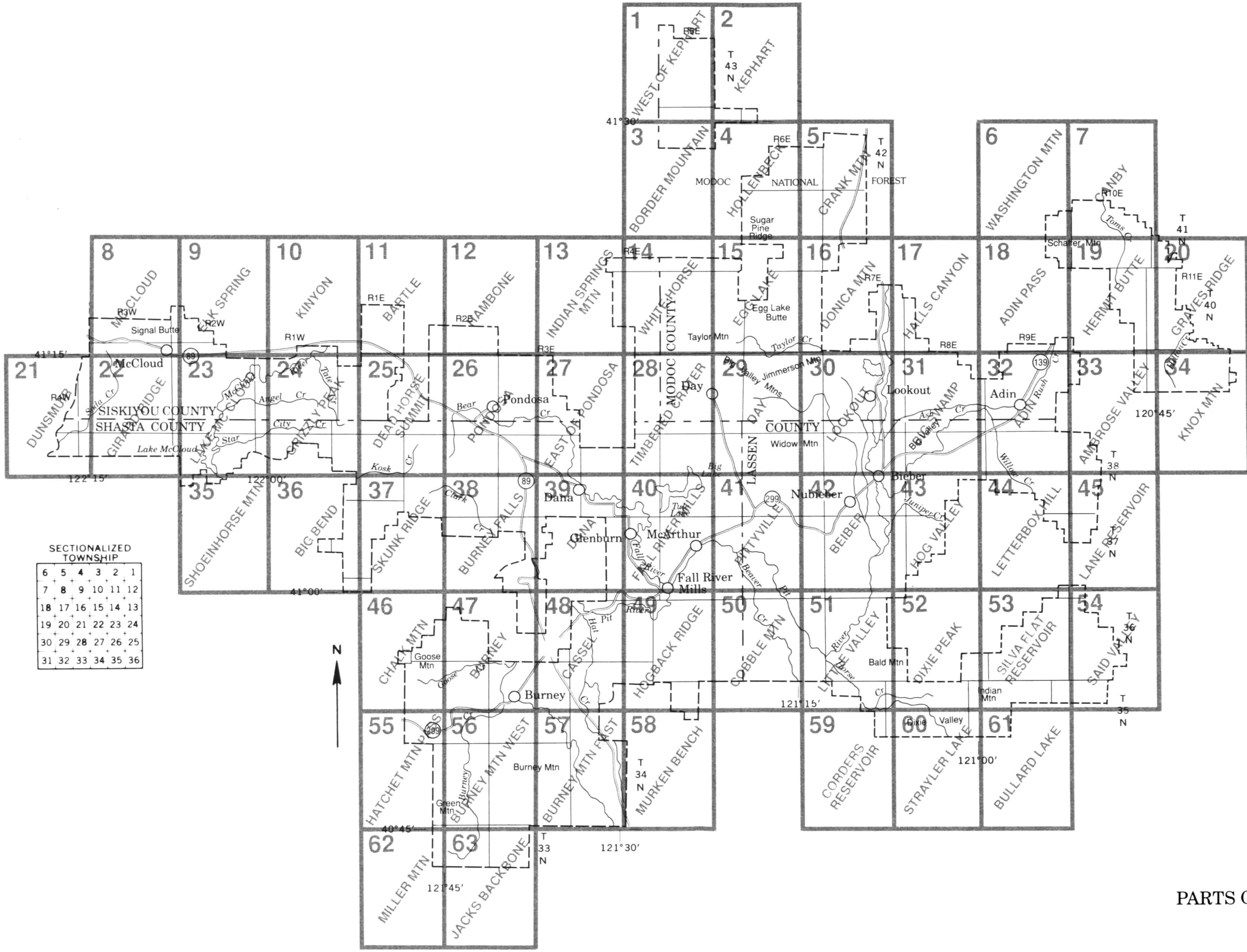
Soil name	Family or higher taxonomic class
Lassen	Fine, smectitic, mesic Leptic Haploxererts
Lasvar	Fine, smectitic, mesic Aquic Durixererts
Longbell	Medial over sandy or sandy-skeletal, mixed, mesic Humic Vitrixerands
Longbilly	Fine, smectitic, mesic Typic Natrixeralfs
Longcreek	Clayey-skeletal, smectitic, mesic Lithic Argixerolls
Lonkey	Fine-loamy, mixed, superactive, mesic Pachic Argixerolls
Loveness	Fine-loamy, mixed, superactive, mesic Ultic Palexerolls
Lunsford	Fine-loamy, mixed, superactive, mesic Aquic Haploxerolls
Malinda	Loamy, mixed, superactive, mesic Lithic Argixerolls
*Matquaw	Coarse-loamy over sandy or sandy-skeletal, mixed, active, mesic Pachic Ultic Haploxerolls
Medici	Medial over loamy-skeletal, mixed, superactive, frigid Typic Haploxerands
Medlake	Pumiceous or ashy-pumiceous over medial, mixed, nonacid, frigid Vitrandic Xerorthents
Modoc	Fine-loamy, mixed, superactive, mesic Argiduridic Durixerolls
Mounthat	Medial-skeletal, mixed, frigid Pachic Melanoxerands
Murken	Loamy-skeletal, mixed, superactive, mesic Pachic Haploxerolls
Nanny	Loamy-skeletal, mixed, superactive, frigid Typic Xerumbrepts
Neer	Medial-skeletal, mixed, mesic Typic Vitrixerands
Neuns	Loamy-skeletal, mixed, active, mesic Dystric Xerochrepts
Nikal	Medial over loamy-skeletal, mixed, superactive, mesic Humic Haploxerands
Nosoni	Fine-loamy, mixed, superactive, mesic Typic Argiaquolls
Obie	Medial-skeletal, mixed, frigid Typic Melanoxerands
Odas	Coarse-loamy, mixed, superactive, nonacid, mesic Cumulic Humaquepts
Ollierivas	Fine, smectitic, mesic Argiduridic Durixerolls
Orhood	Loamy-skeletal, mixed, superactive, mesic Lithic Argixerolls
*Oxendine	Loamy, mixed, superactive, mesic, shallow Argiduridic Durixerolls
Pastolla	Fine-silty, mixed, superactive, mesic Cumulic Endoaquolls
Patburn	Fine, smectitic, mesic Pachic Argixerolls
Pit	Fine, smectitic, mesic Xeric Endoaquerts
Pittville	Fine-loamy, mixed, superactive, mesic Typic Argixerolls
Pitvar	Fine, smectitic, mesic Typic Epiaquerts
Ponto	Medial, mixed, mesic Typic Vitrixerands
Quaking	Loamy-skeletal, mixed, superactive, mesic Andic Haploxeralfs
Ravendale	Fine, smectitic, mesic Chromic Haploxererts
Revit	Medial, mixed, frigid Humic Haploxerands
*Ricketts	Loamy-skeletal, mixed, superactive, mesic Pachic Argixerolls
Rivalier	Ashy-skeletal, mixed, frigid Typic Vitrixerands
Roundbarn	Loamy-skeletal, mixed, superactive, frigid Vitrandic Argixerolls
Said	Fine-loamy, mixed, superactive, frigid Vitrandic Argixerolls
Scarface	Medial, mixed, mesic Alfic Vitrixerands
*Searvar	Loamy-skeletal, mixed, superactive, mesic Aridic Argixerolls
Shasta	Ashy, superactive, mesic Humic Vitrixerands
Shastina	Medial over sandy or sandy-skeletal, mixed, mesic Humic Haploxerands
Splawn	Clayey-skeletal, smectitic, mesic Ultic Argixerolls
Stacher	Medial over loamy-skeletal, mixed, superactive, frigid Typic Haploxerands
Stoner	Coarse-loamy, mixed, active, mesic Typic Xerochrepts
Stukel	Loamy, mixed, superactive, mesic Lithic Haploxerolls
Swanberger	Fine, smectitic, mesic Cumulic Vertic Epiaquolls
*Sweagert	Fine-loamy, mixed, superactive, mesic Typic Durixerolls
Tionesta	Pumiceous or ashy-pumiceous over medial-skeletal, mixed, frigid Typic Haploxerands
Trojan	Fine-loamy, mixed, superactive, frigid Ultic Argixerolls
Twinbuttes	Medial-skeletal, frigid Typic Vitrixerands
Typic Vitrixerands	Typic Vitrixerands
Vansickle	Clayey-skeletal, smectitic, mesic, shallow Abruptic Argiduridic Durixerolls
Wengler	Medial-skeletal, mixed, frigid Typic Haploxerands
Whipp	Fine, smectitic, mesic Natric Duraquolls
Whitinger	Loamy-skeletal, mixed, mesic Typic Argixerolls
Winnibulli	Fine-loamy, mixed, superactive, mesic Aquultic Argixerolls
Witcher	Fine-loamy, mixed, superactive, frigid Andic Haploxeralfs

Table 19.--Classification of the Soils--Continued

Soil name	Family or higher taxonomic class
Wyntoon	Fine-loamy, mixed, superactive, mesic Andic Palexeralfs
Xerorthents	Xerorthents
Zeugirdor	Medial-skeletal, mixed, frigid Ultic Haploxerands

NRCS Accessibility Statement

The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.



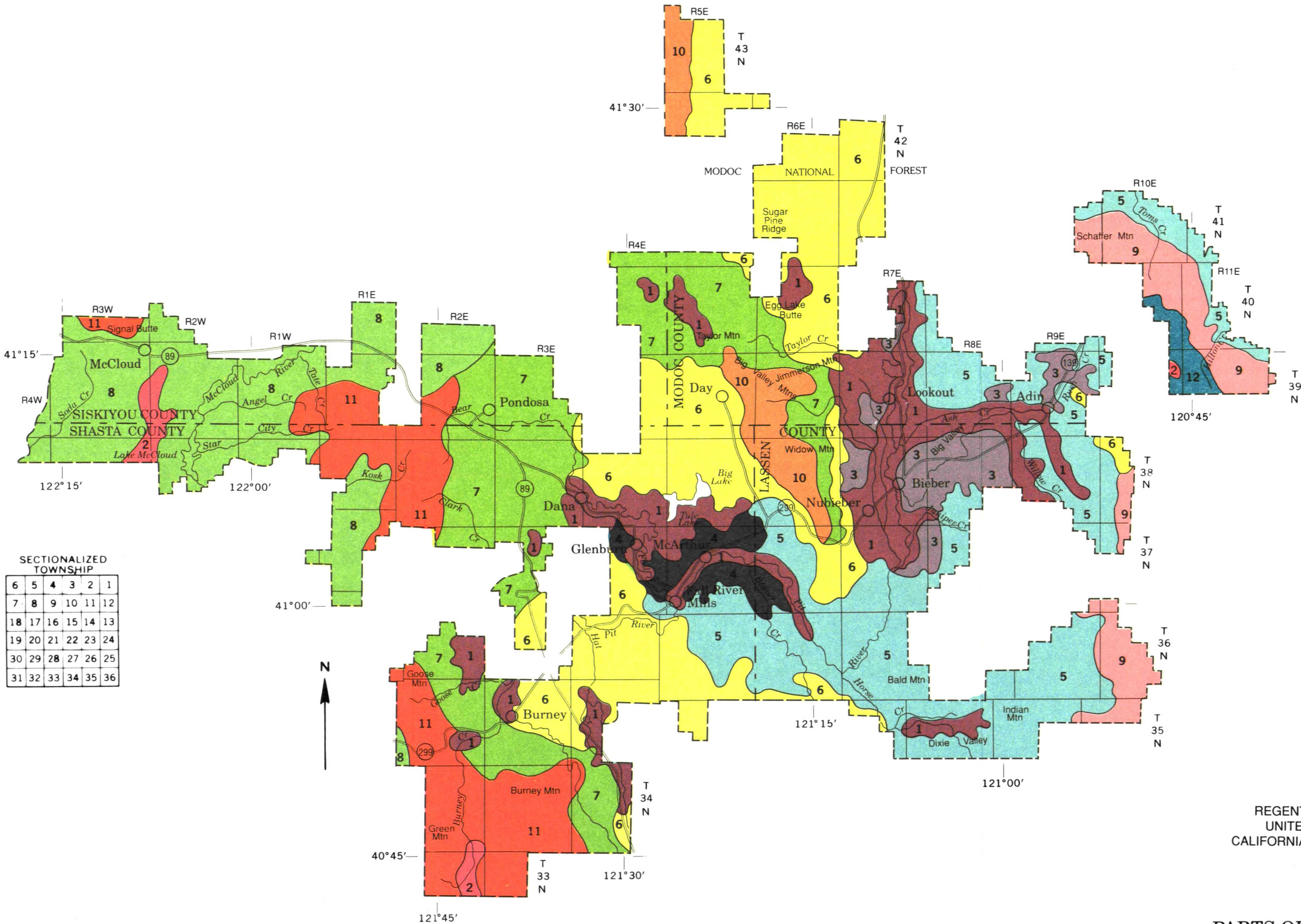
INDEX TO MAP SHEETS

INTERMOUNTAIN AREA, CALIFORNIA
PARTS OF LASSEN, MODOC, SHASTA, AND SISKIYOU COUNTIES

Scale 1:506,880

1 0 1 2 3 4 5 6 7 8 Miles

0 8 16 Km



SOIL LEGEND*

MESIC SOILS IN BASINS OR ON STREAM OR FAN TERRACES WITH SLIGHT VOLCANIC INFLUENCE

1 Pit-Pastolla-Lasvar

FRIGID SOILS IN BASINS OR ON STREAM TERRACES OR ALLUVIAL FANS WITH SLIGHT VOLCANIC INFLUENCE

2 Nanny-Jacksback-Esro

MESIC SOILS ON STREAM TERRACES WITH SLIGHT VOLCANIC INFLUENCE

3 Modoc-Oxendine-Bieber

4 Pittville-Dudgen-Esperanza

MESIC SOILS ON LAVA PLATEAUS WITH SLIGHT VOLCANIC INFLUENCE

5 Jellycamp-Jellico-Adinot

MESIC SOILS ON LAVA PLATEAUS AND HILLS WITH STRONG VOLCANIC INFLUENCE

6 Loveness-Hunsinger-Lava Flows

7 Jimmerson-Gasper-Scarface

8 Neuns-Ponto-Neer

FRIGID SOILS ON MOUNTAINS WITH STRONG VOLCANIC INFLUENCE

9 Gosch-Witcher-Trojan

10 Rivalier-Tionesta-Blankout

11 Obie-Goulder-Mounthat

CRYIC SOILS ON MOUNTAINS WITH STRONG VOLCANIC INFLUENCE

12 Canyoncreek-Hermit

*The units on this legend are described in the text under the heading "General Soil Map Units."

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
REGENTS OF THE UNIVERSITY OF CALIFORNIA, AGRICULTURAL EXPERIMENT STATION
UNITED STATES DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT
CALIFORNIA DEPARTMENT OF FORESTRY AND FIRE PROTECTION, SOIL-VEGETATION SURVEY

GENERAL SOIL MAP

INTERMOUNTAIN AREA, CALIFORNIA
PARTS OF LASSEN, MODOC, SHASTA, AND SISKIYOU COUNTIES

Scale 1:506,880

1 0 1 2 3 4 5 6 7 8 Miles

0 8 16 Km

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

SOIL LEGEND

The publication symbols consist of three numbers starting consecutively with 101 through the map units arranged alphabetically.

SYMBOL	NAME
101	Adinot very gravelly sandy loam, 2 to 15 percent slopes
102	Adinot very cobbly sandy loam, 2 to 15 percent slopes
103	Adinot very cobbly sandy loam, 15 to 30 percent slopes
104	Adinot very stony sandy loam, 2 to 15 percent slopes
105	Adinot-Adinot, eroded, complex, 2 to 15 percent slopes
106	Badenaugh-Matquaw association, 2 to 15 percent slopes
107	Bieber-Esperanza complex, 0 to 2 percent slopes
108	Bieber-Modoc complex, 0 to 5 percent slopes
109	Blankout-Medici complex, 2 to 15 percent slopes
110	Boardburn-Hambone complex, 5 to 15 percent slopes
111	Bollibokka loam, 2 to 15 percent slopes
112	Bollibokka loam, 30 to 50 percent slopes
113	Bollibokka loam, 50 to 75 percent slopes
114	Britton silty clay loam, 5 to 15 percent slopes
115	Britton silty clay loam, 15 to 30 percent slopes
116	Britton silty clay loam, 30 to 50 percent slopes
117	Bundora-Goulder complex, 2 to 15 percent slopes
118	Bundora-Goulder complex, 15 to 30 percent slopes
119	Bundora-Goulder complex, 30 to 50 percent slopes
120	Bunselmeier very gravelly sandy loam, 15 to 30 percent slopes
121	Burman-Lasvar complex, 0 to 2 percent slopes
122	Burney-Arkright complex, 2 to 9 percent slopes
123	Canyoncreek-Hermit complex, 15 to 30 percent slopes
124	Canyoncreek-Hermit complex, 30 to 50 percent slopes
125	Carberry gravelly fine sandy loam, 2 to 15 percent slopes
126	Carberry gravelly fine sandy loam, 15 to 30 percent slopes
127	Carberry gravelly fine sandy loam, 30 to 50 percent slopes
128	Carberry, warm-Ponto complex, 2 to 15 percent slopes
129	Carberry, warm-Ponto complex, 15 to 30 percent slopes
130	Carberry, warm-Lava flows complex, 15 to 30 percent slopes
131	Chalkford loam, 0 to 2 percent slopes
132	Chatterdown-Nikal complex, 2 to 15 percent slopes
133	Chirpchatter-Hunsinger complex, 2 to 15 percent slopes
134	Coneward loamy sand, 2 to 15 percent slopes
135	Coneward loamy sand, 15 to 30 percent slopes
136	Coneward loamy sand, 30 to 50 percent slopes
137	Coneward-Lava flows complex, 2 to 15 percent slopes
138	Cupvar silty clay, 0 to 2 percent slopes
139	Danhunt gravelly sandy loam, 15 to 30 percent slopes
140	Danhunt gravelly sandy loam, 30 to 50 percent slopes
141	Danhunt gravelly sandy loam, 50 to 75 percent slopes
142	Daphnedale loam, 9 to 15 percent slopes
143	Datom clay loam, 2 to 9 percent slopes
144	Dekkas fine sandy loam, 0 to 5 percent slopes
145	Depner gravelly sandy loam, 15 to 30 percent slopes
146	Depner gravelly sandy loam, 30 to 50 percent slopes
147	Deven very cobbly loam, 2 to 15 percent slopes
148	Deven very cobbly loam, 15 to 30 percent slopes
149	Deven very cobbly loam, 30 to 50 percent slopes
150	Dosa-Burman complex, 0 to 2 percent slopes
151	Dotta loam, gravelly substratum, 0 to 2 percent slopes
152	Dotta sandy loam, 2 to 5 percent slopes
153	Dotta sandy loam, 5 to 9 percent slopes
154	Dotta sandy loam, 9 to 15 percent slopes
155	Dotta sandy loam, 15 to 30 percent slopes
156	Dotta-Esperanza complex, moist, 0 to 5 percent slopes
157	Dotta-Ricketts complex, 15 to 30 percent slopes
158	Dotta-Searvar complex, 2 to 15 percent slopes
159	Dudgen-Graven complex, 0 to 5 percent slopes
160	Dudgen-Graven complex, flooded, 0 to 5 percent slopes
161	Esperanza sandy loam, 2 to 5 percent slopes
162	Esperanza loam, 0 to 2 percent slopes
163	Esro silt loam, gravelly substratum, 0 to 2 percent slopes
164	Etsel-Neuns complex, 50 to 75 percent slopes
165	Fiddler-Deven complex, 15 to 30 percent slopes
166	Fiddler-Deven complex, 30 to 50 percent slopes
167	Fiddler-Whitinger complex, 5 to 15 percent slopes
168	Fiddler-Whitinger complex, 15 to 30 percent slopes
169	Gardens-Jacksback complex, 0 to 2 percent slopes
170	Gasper-Scarface complex, 15 to 30 percent slopes
171	Gasper-Scarface complex, 30 to 50 percent slopes
172	Gasper-Scarface complex, moist, 2 to 15 percent slopes
173	Gasper-Scarface complex, moist, 15 to 30 percent slopes
174	Gasper-Scarface complex, moist, 30 to 50 percent slopes
175	Gooval cobbly loam, 2 to 9 percent slopes
176	Gosch very stony sandy loam, 15 to 30 percent slopes
177	Gosch-Witcher complex, 30 to 50 percent slopes
178	Goulder gravelly sandy loam, 2 to 15 percent slopes
179	Goulder gravelly sandy loam, 15 to 30 percent slopes
180	Goulder gravelly sandy loam, 30 to 50 percent slopes
181	Gullied land-Rock outcrop-Mounthat complex, 50 to 75 percent slopes
182	Hambone-Boardburn complex, 15 to 30 percent slopes
183	Hambone-Boardburn complex, 30 to 50 percent slopes
184	Henhill silt loam, partially drained, 0 to 2 percent slopes
185	Henhill silt loam, gravelly substratum, 0 to 2 percent slopes
186	Hermit-Canyoncreek complex, 2 to 15 percent slopes
187	Hunsinger-Chirpchatter complex, 2 to 15 percent slopes
188	Hunsinger-Chirpchatter complex, 15 to 30 percent slopes
189	Hunsinger-Chirpchatter complex, 30 to 50 percent slopes
190	Jacksback loam, 2 to 9 percent slopes
191	Jadpor gravelly sandy loam, 0 to 5 percent slopes
192	Jadpor very gravelly sandy loam, 0 to 5 percent slopes
193	Jahjo-Lava flows-Loveness complex, 2 to 15 percent slopes
194	Jellico-Lava flows complex, 5 to 15 percent slopes
195	Jellico-Splawn complex, 15 to 30 percent slopes
196	Jellico-Splawn complex, 30 to 50 percent slopes
197	Jellycamp extremely gravelly sandy loam, 2 to 5 percent slopes
198	Jellycamp-Karcal-Longcreek complex, 2 to 15 percent slopes
199	Jellycamp-Karcal-Longcreek complex, cool, 2 to 15 percent slopes
200	Jellycamp-Lassen-Longcreek complex, 2 to 15 percent slopes
201	Jellycamp-Ollierivas complex, 2 to 9 percent slopes
202	Jellycamp-Splawn-Ollierivas complex, 2 to 15 percent slopes
203	Jellycamp-Splawn-Ricketts complex, 2 to 30 percent slopes
204	Jellycamp-Vansickle complex, very cobbly loam, 2 to 9 percent slopes
205	Jellycamp-Vansickle complex, extremely stony loam, 2 to 9 percent slopes
206	Jellycamp-Vansickle complex, warm, 2 to 9 percent slopes
207	Jimmerson loam-Jimmerson stony sandy loam complex, 2 to 15 percent slopes
208	Jimmerson loam-Jimmerson stony sandy loam complex, 15 to 30 percent slopes
209	Jimmerson stony loam-Jimmerson loam complex, 30 to 50 percent slopes
210	Karcal-Cuppy complex, 2 to 15 percent slopes
211	Keddie muck, 0 to 1 percent slopes
212	Keddie loam, 0 to 2 percent slopes
213	Keddie silt loam, 0 to 2 percent slopes
214	Kephart-Quaking complex, 2 to 15 percent slopes
215	Kettlebelly gravelly loam, 5 to 15 percent slopes
216	Kettlebelly, dry-Neuns complex, 15 to 30 percent slopes
217	Kettlebelly, dry-Neuns complex, 30 to 50 percent slopes
218	Kettlebelly-Neuns complex, 15 to 30 percent slopes
219	Kettlebelly-Neuns complex, 30 to 50 percent slopes
220	Kilarc gravelly silt loam, 2 to 15 percent slopes
221	Kilarc gravelly silt loam, 15 to 30 percent slopes
222	Kilarc gravelly silt loam, 30 to 50 percent slopes
223	Kindig-Neuns complex, 15 to 30 percent slopes
224	Kindig-Neuns complex, 30 to 50 percent slopes
225	Lassen-Cuppy complex, 2 to 15 percent slopes
226	Lasvar clay, 0 to 2 percent slopes
227	Lasvar-Pitvar complex, 0 to 2 percent slopes
228	Lava flows
229	Lava flows-Gassaway complex, 2 to 15 percent slopes
230	Lava flows-Neer complex, 2 to 15 percent slopes
231	Longbell gravelly coarse sandy loam, 2 to 15 percent slopes
232	Longbell-Lava flows complex, 2 to 15 percent slopes
233	Longbilly-Modoc complex, 0 to 2 percent slopes
234	Longbilly-Pit complex, 0 to 2 percent slopes
235	Longcreek-Vansickle-Rock outcrop complex, 9 to 30 percent slopes
236	Lonkey-Datom complex, 2 to 15 percent slopes
237	Lonkey-Malinda complex, 2 to 15 percent slopes
238	Lonkey-Malinda complex, 15 to 30 percent slopes
239	Lonkey-Malinda complex, cool, 15 to 30 percent slopes
240	Loveness-Fleener complex, 2 to 15 percent slopes
241	Loveness-Fleener complex, 15 to 30 percent slopes
242	Lunsford loam, 0 to 2 percent slopes
243	Malinda extremely gravelly sandy loam, 2 to 15 percent slopes
244	Malinda extremely gravelly sandy loam, 15 to 30 percent slopes
245	Malinda extremely gravelly sandy loam, 30 to 50 percent slopes
246	Malinda very cobbly loam, 30 to 50 percent slopes
247	Matquaw gravelly sandy loam, 0 to 5 percent slopes
248	Matquaw very gravelly sandy loam, 0 to 2 percent slopes
249	Medici-Blankout complex, 15 to 30 percent slopes
250	Medlake gravelly coarse sandy loam, 2 to 15 percent slopes
251	Medlake gravelly coarse sandy loam, 15 to 30 percent slopes
252	Modoc loam, slightly sodic, 0 to 2 percent slopes
253	Modoc sandy loam, 2 to 5 percent slopes
254	Mounthat-Rock outcrop complex, 50 to 75 percent slopes
255	Murken very stony loam, 15 to 30 percent slopes
256	Nanny gravelly sandy loam, 0 to 9 percent slopes
257	Neer gravelly sandy loam, 50 to 75 percent slopes
258	Neer-Ponto, dark surface, complex, 30 to 50 percent slopes
259	Neer-Ponto complex, 2 to 30 percent slopes
260	Neer-Ponto complex, 30 to 50 percent slopes
261	Neuns-Kettlebelly complex, 50 to 75 percent slopes
262	Neuns-Kettlebelly, dry, complex, 50 to 75 percent slopes
263	Neuns-Kindig complex, 50 to 75 percent slopes
264	Nikal-Chatterdown-Lava flows complex, 2 to 9 percent slopes
265	Nosoni loam, 0 to 5 percent slopes
266	Obie-Mounthat complex, 5 to 15 percent slopes
267	Obie-Mounthat complex, 15 to 30 percent slopes
268	Obie-Mounthat complex, 30 to 50 percent slopes
269	Odas loam, 0 to 2 percent slopes
270	Oxendine-Lonkey complex, 2 to 9 percent slopes
271	Oxendine-Sweagert complex, 0 to 5 percent slopes
272	Oxendine-Sweagert complex, 2 to 5 percent slopes
273	Oxendine-Sweagert complex, 2 to 9 percent slopes
274	Pastolla muck, 0 to 1 percent slopes
275	Pastolla muck, drained, 0 to 2 percent slopes
276	Pastolla mucky silt loam, channeled, 0 to 2 percent slopes
277	Patburn loam, 0 to 2 percent slopes
278	Patburn clay loam, 0 to 2 percent slopes
279	Pit silty clay, drained, 0 to 2 percent slopes
280	Pit silty clay, frequently flooded, 0 to 1 percent slopes
281	Pits-Dumps complex
282	Pittville sandy loam, 0 to 5 percent slopes
283	Pittville sandy loam, 5 to 9 percent slopes
284	Pittville sandy loam, 9 to 15 percent slopes
285	Pittville sandy loam, 15 to 30 percent slopes
286	Ponto sandy loam, 2 to 15 percent slopes
287	Ponto-Neer, dark surface, complex, 15 to 30 percent slopes
288	Ponto-Wyntoon complex, 2 to 15 percent slopes
289	Quaking-Kephart complex, 15 to 30 percent slopes
290	Ravendale silty clay, 0 to 2 percent slopes
291	Revit fine sandy loam, 2 to 30 percent slopes
292	Ricketts-Orhood complex, 2 to 15 percent slopes
293	Ricketts-Orhood complex, 15 to 30 percent slopes
294	Ricketts-Orhood complex, 30 to 50 percent slopes
295	Ricketts-Sweagert complex, 2 to 15 percent slopes
296	Ricketts-Searvar complex, 5 to 15 percent slopes
297	Rivalier very gravelly sandy loam, 15 to 30 percent slopes
298	Rivalier very gravelly sandy loam, 30 to 50 percent slopes
299	Rivalier very gravelly sandy loam, 50 to 75 percent slopes
300	Riverwash
301	Roundbarn-Said complex, 15 to 30 percent slopes
302	Rubble land-Argixerolls-Rock outcrop complex, 30 to 75 percent slopes
303	Rubble land-Rock outcrop complex, 30 to 75 percent slopes
304	Rubble land-Typic Vitrixerands complex, 30 to 50 percent slopes
305	Rubble land-Xerorthents complex, 50 to 70 percent slopes
306	Scarface sandy loam, 2 to 15 percent slopes
307	Scarface sandy loam, 15 to 30 percent slopes
308	Scarface-Gasper complex, 2 to 15 percent slopes
309	Shasta loamy sand, 0 to 5 percent slopes
310	Shastina loam, 0 to 5 percent slopes
311	Splawn-Jellico complex, 5 to 15 percent slopes
312	Stacher gravelly coarse sandy loam, 15 to 30 percent slopes
313	Stacher gravelly coarse sandy loam, 2 to 15 percent slopes
314	Stacher very gravelly coarse sandy loam, 30 to 50 percent slopes
315	Stoner gravelly sandy loam, 2 to 15 percent slopes
316	Stukel complex, 15 to 30 percent slopes
317	Swanberger clay, 0 to 1 percent slopes
318	Swanberger muck, 0 to 1 percent slopes
319	Sweagert loam, 2 to 5 percent slopes
320	Tionesta very gravelly loamy coarse sand, 2 to 15 percent slopes
321	Tionesta very gravelly loamy coarse sand, 15 to 30 percent slopes
322	Trojan-Erig complex, 15 to 30 percent slopes
323	Twinbuttes very gravelly coarse sandy loam, 30 to 50 percent slopes
324	Twinbuttes-Lava flows complex, 2 to 15 percent slopes
325	Wengler very gravelly coarse sandy loam, 5 to 15 percent slopes
326	Wengler very gravelly coarse sandy loam, 15 to 30 percent slopes
327	Wengler very gravelly coarse sandy loam, 30 to 50 percent slopes
328	Whipp-Cupvar complex, 0 to 2 percent slopes
329	Whipp-Cupvar complex, slightly saline, 0 to 2 percent slopes
330	Winnibulli loam, 0 to 2 percent slopes
331	Winnibulli loam, gravelly substratum, 0 to 5 percent slopes
332	Winnibulli-Burman complex, 0 to 5 percent slopes
333	Witcher-Gosch complex, 2 to 15 percent slopes
334	Witcher-Gosch complex, 15 to 30 percent slopes
335	Wyntoon sandy loam, 2 to 15 percent slopes
336	Wyntoon sandy loam, 15 to 30 percent slopes
337	Wyntoon-Depner complex, 5 to 15 percent slopes
338	Zeugirdor-Goulder complex, 15 to 30 percent slopes
339	Zeugirdor-Goulder complex, 30 to 50 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- County or parish
- Reservation (national forest or park, state forest or park, and large airport)
- Limit of soil survey (label)
- Field sheet matchline and neatline

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line

LAKES, PONDS AND RESERVOIRS

- Perennial

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Hot Spring
- Meadow 1/ or 2/

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS 121 133

SOIL SAMPLE (normally not shown)

MISCELLANEOUS

- Blowout 1/
- Clay spot 1/
- Gravelly spot 1/
- Gumbo, slick or scabby spot (sodic) 1/
- Dumps and other similar non soil areas 1/
- Prominent hill or peak 1/
- Rock outcrop (includes sandstone and shale) 1/
- Saline spot 1/
- Sandy spot 1/
- Severely eroded spot 1/
- Slide or slip (tips point upslope) 1/
- Stony spot, very stony spot 1/

1/ Each symbol represents an area of 2 acres or less.

2/ Each symbol represents an area of 2 to 20 acres.

20 acres or larger;
Label.
ie.

MEADOW

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

WEST OF KEPHART, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 1 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

KEPHART, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 2 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

BORDER MOUNTAIN, CALIFORNIA
7.5 MINUTE SERIES

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 10.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

HOLLENBECK, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 4 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 2, Kephart

Joins sheet 4, Hollenbeck

Joins sheet 16, Donica Mountain

Joins sheet 15, Egg Lake

Joins sheet 17, Halls Canyon

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

CRANK MOUNTAIN, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 5 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

WASHINGTON MOUNTAIN, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 6 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

120°52'30" R. 9 E. R. 10 E. 120°50'00" 120°47'30" 120°45'00" R. 10 E. R. 11 E.

41°30'00" 41°30'00"

41°27'30" 41°27'30"

Joins sheet 6, Washington Mountain

T. 42 N.
T. 41 N.

T. 42 N.
T. 41 N.

41°25'00" 41°25'00"

41°22'30" R. 9 E. R. 10 E. 120°52'30" 120°50'00" 120°47'30" R. 10 E. R. 11 E. 120°45'00" 41°22'30"

Joins sheet 19, Hermit Butte

Joins sheet 18, Adin Pass

Joins sheet 20, Graven Ridge

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

CANBY & RATTLESNAKE BUTTE, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 7 OF 63

122°15'00" 122°12'30" 122°10'00" 122°07'30"
R. 4 W. R. 3 W. R. 3 W. R. 2 W.
41°22'30" 41°22'30"
T. 41 N. T. 40 N. T. 41 N. T. 40 N.
41°20'00" 41°20'00"

Joins sheet 9, Elk Spring

41°17'30" 41°17'30"
T. 40 N. T. 39 N. T. 40 N. T. 39 N.
41°15'00" 41°15'00"
122°15'00" 122°12'30" 122°10'00" R. 3 W. R. 2 W. 122°07'30"

Joins sheet 322, Girard Ridge

Joins sheet 21, Dunsmuir

Joins sheet 23, Lake McCloud

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1 MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETERS

QUADRANGLE LOCATION

MCCLOUD, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 8 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

ELK SPRING, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 9 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
KINYON QUADRANGLE
SHEET NUMBER 10 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

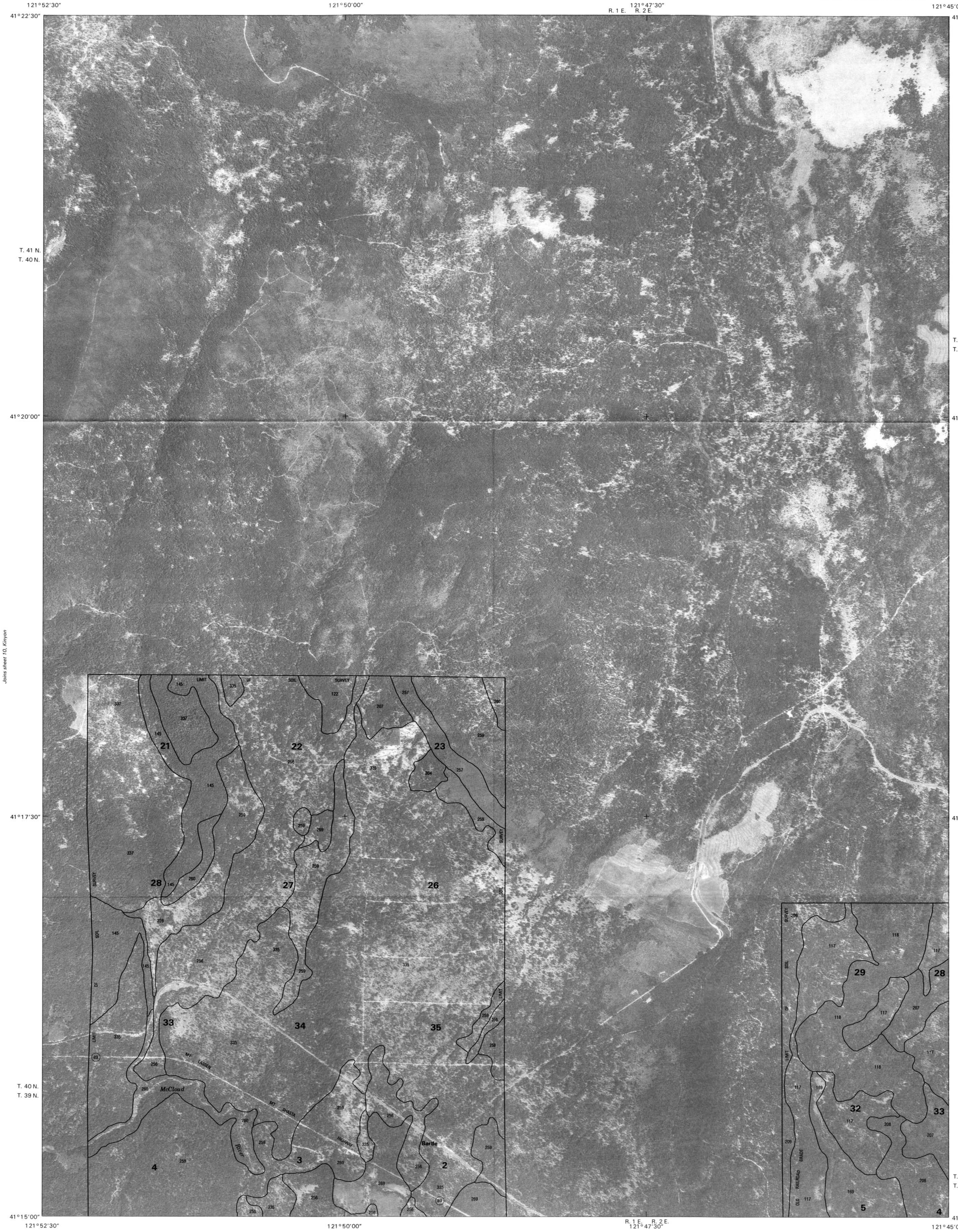
1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

KINYON, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 10 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 10.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

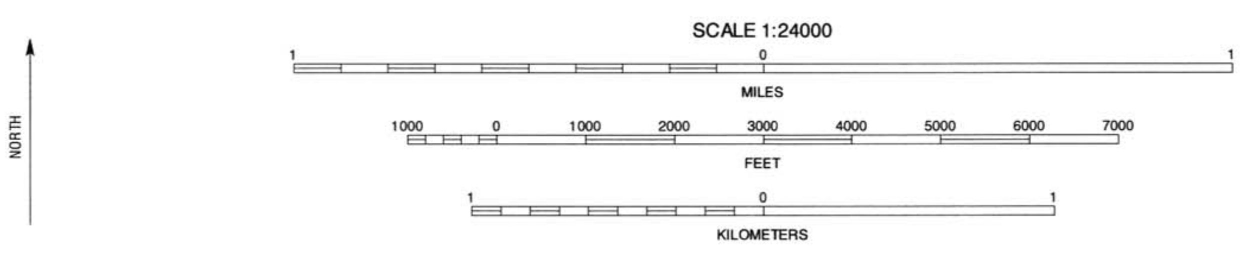
1 0 1
KILOMETERS

QUADRANGLE LOCATION

BARTLE, CALIFORNIA
7.5 MINUTE SERIES

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



QUADRANGLE LOCATION

HAMBONE, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 12 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

INDIAN SPRING MOUNTAIN, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 13 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
WHITE HORSE QUADRANGLE
SHEET NUMBER 14 OF 63

Joins sheet 3, Border Mountain

Joins sheet 4, Hollenbeck

Joins sheet 13, Indian Spring Mountain

Joins sheet 15, Egg Lake

Joins sheet 28, Timbered Crater

Joins sheet 27, East of Pondosa

Joins sheet 29, Day

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

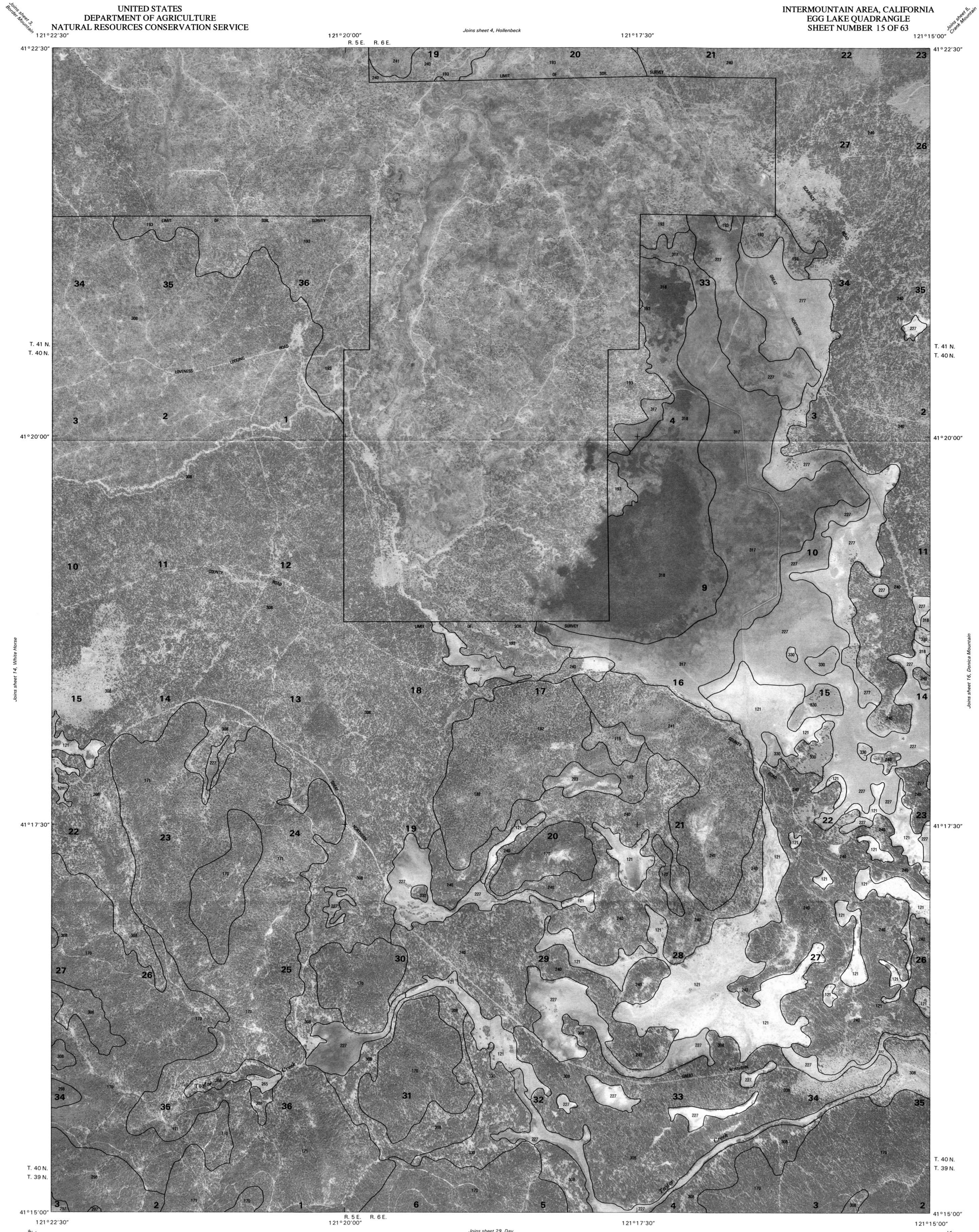
1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

WHITE HORSE, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 14 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1 MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETERS

QUADRANGLE LOCATION

EGG LAKE, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 15 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

DONICA MOUNTAIN, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 16 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 10.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

HALLS CANYON, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 17 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

ADIN PASS, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 18 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 6, Washington Mountain

Joins sheet 7, Canby

Joins sheet 34, Knob Mountain

120°52'30" 120°50'00" 120°47'30" 120°45'00"
41°22'30"

Joins sheet 18, Adin Pass

Joins sheet 20, Graven Ridge

R. 9 E. R. 10 E. R. 10 E. R. 11 E.
T. 41 N. T. 40 N. T. 39 N.
41°20'00" 41°17'30" 41°15'00"

Joins sheet 32, Adin

Joins sheet 33, Ambrose Valley

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

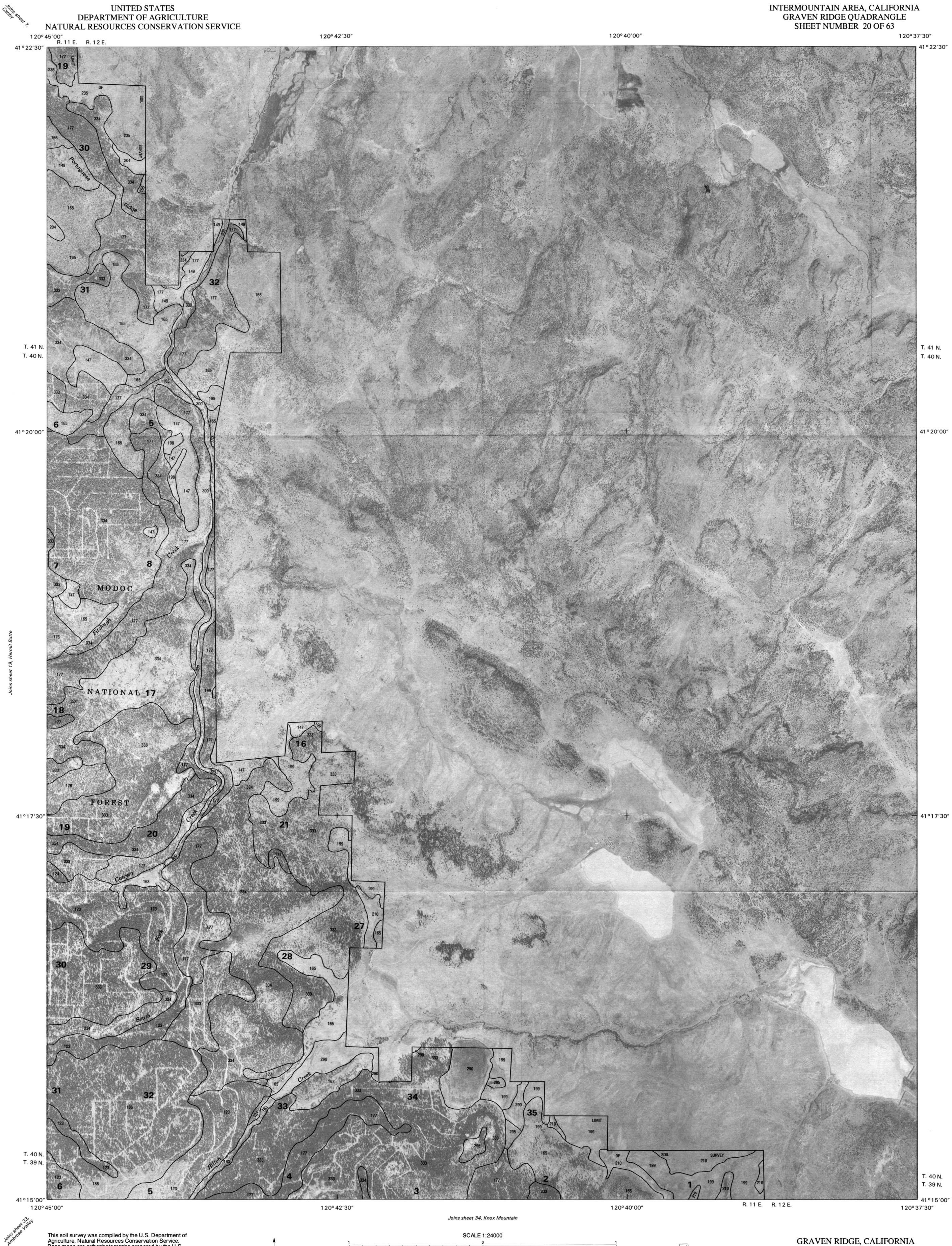
FEET

KILOMETERS

QUADRANGLE LOCATION

HERMIT BUTTE, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 19 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

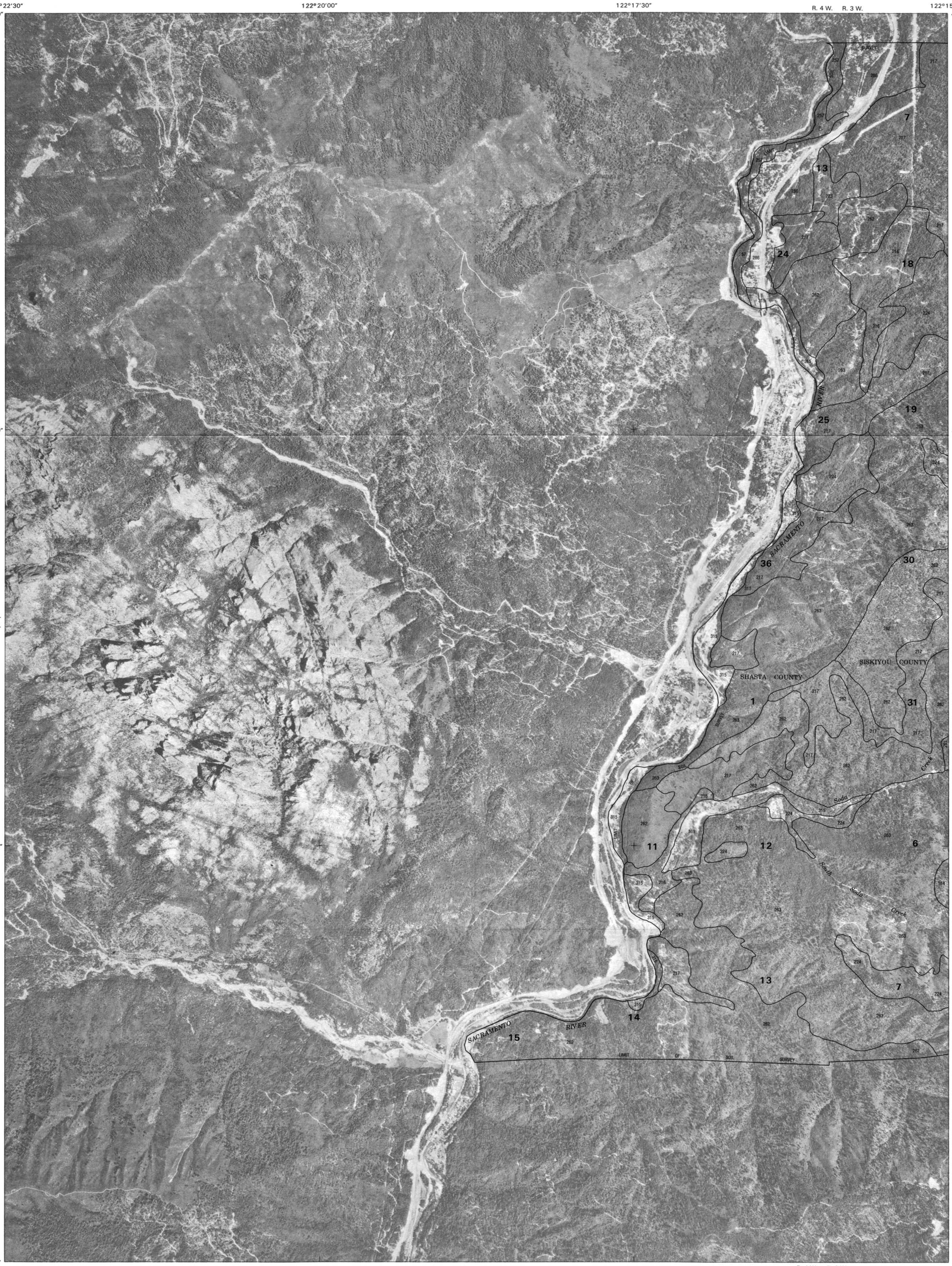
KILOMETERS

QUADRANGLE LOCATION

GRAVEN RIDGE, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 20 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
DUNSMUIR QUADRANGLE
SHEET NUMBER 21 OF 63



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

DUNSMUIR, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 21 OF 63

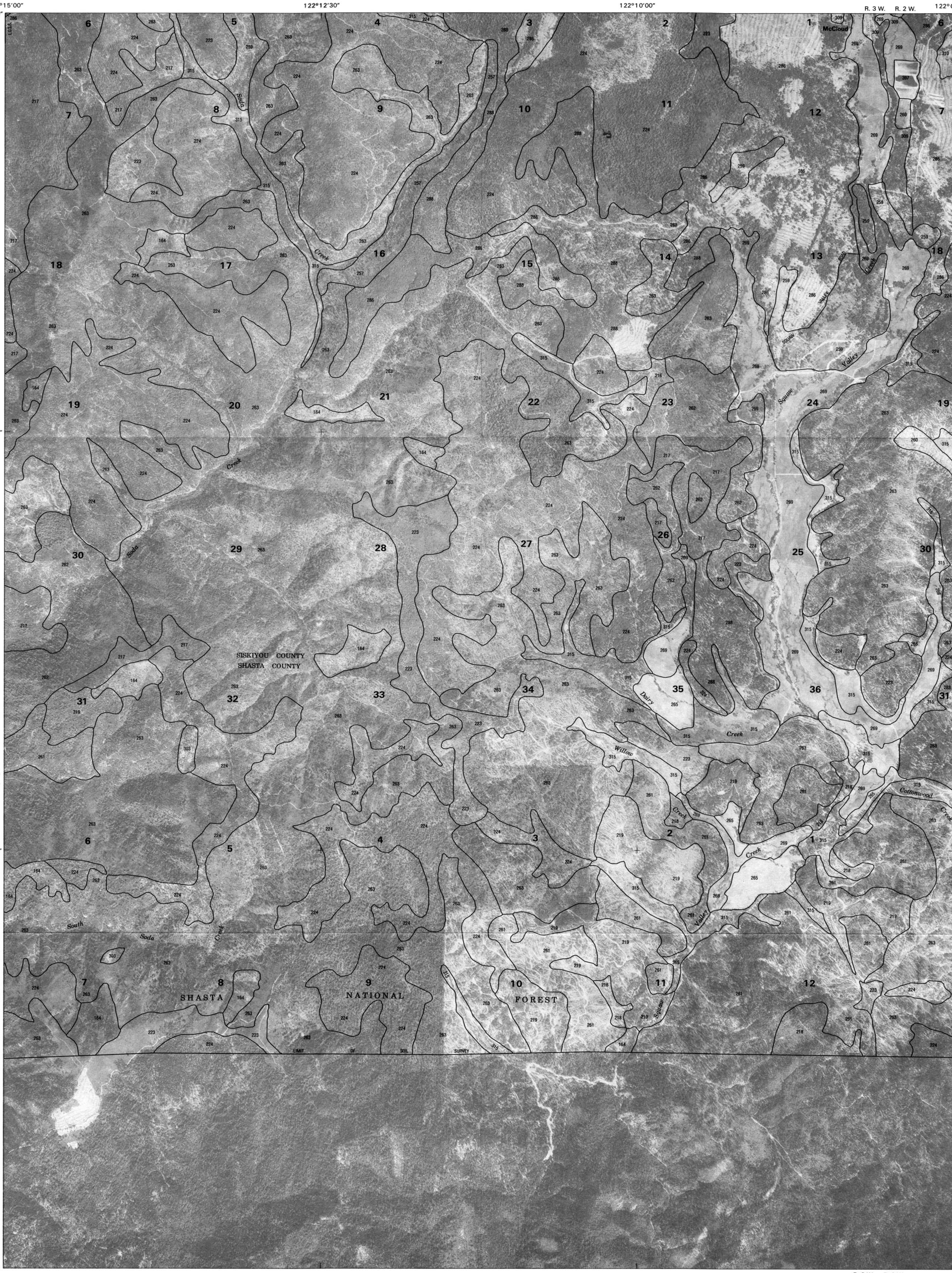
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 8, McCloud

Joins sheet 9, Elk Spring

122°15'00" 122°12'30" 122°10'00" R. 3 W. R. 2 W. 122°07'30"

41°15'00" 41°15'00"



41°12'30" 41°12'30"

Joins sheet 21, Dunsmuir

Joins sheet 23, Lake McCloud

T. 39 N. T. 38 N. T. 39 N. T. 38 N.

41°10'00" 41°10'00"

41°07'30" 41°07'30"

122°15'00" 122°12'30" 122°10'00" R. 3 W. R. 2 W. 122°07'30"

Joins sheet 35, Shoeinhorse Mountain

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1 MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETERS

QUADRANGLE LOCATION

GIRARD RIDGE, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 22 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
LAKE MCCLOUD QUADRANGLE
SHEET NUMBER 23 OF 63

Joins sheet 8, McCloud

Joins sheet 9, Elk Spring

Joins sheet 10, Kinyon

122°07'30" 122°05'00" 122°02'30" R. 2 W. R. 1 W. 122°00'00"

41°15'00"

41°12'30"

41°10'00"

T. 39 N.
T. 38 N.

Joins sheet 22, Girard Ridge

Joins sheet 24, Grizzly Peak

41°07'30"

122°07'30" 122°05'00" 122°02'30" R. 2 W. R. 1 W. 122°00'00"

Joins sheet 35, Shoeinhorse Mountain

Joins sheet 36, Big Bend

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

LAKE MCCLOUD, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 23 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
GRIZZLY PEAK QUADRANGLE
SHEET NUMBER 24 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1 MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETERS

QUADRANGLE LOCATION

GRIZZLY PEAK, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 24 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 10, Kenyon — Joins sheet 11, Bartle — Joins sheet 12, Hambone

121°52'30" 121°50'00" 121°47'30" R. 1 E. R. 2 E. 121°45'00"

41°15'00"

41°12'30" — 41°10'00" T. 39 N. T. 38 N. — 41°07'30"

Joins sheet 24, Grizzly Peak — Joins sheet 26, Pondosa

121°52'30" 121°50'00" R. 1 E. R. 2 E. 121°47'30" 121°45'00"

Joins sheet 36, Big Bend — Joins sheet 37, Skunk Ridge — Joins sheet 38, Burney Falls

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1 MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETERS

QUADRANGLE LOCATION

DEAD HORSE SUMMIT, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 25 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
PONDOSA QUADRANGLE
SHEET NUMBER 26 OF 63

Joins sheet 11, Bartle

Joins sheet 12, Hambone

Joins sheet 13, Indian Spring Mountain

Joins sheet 37, Skunk Ridge

Joins sheet 38, Burney Falls

Joins sheet 39, Dana

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

PONDOSA, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 26 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
EAST OF PONDOSA QUADRANGLE
SHEET NUMBER 27 OF 63

Joins sheet 12, Hambone

Joins sheet 13, Indian Spring Mountain

Joins sheet 14, White Horse

121°37'30" 121°35'00" 121°32'30" 121°30'00"

41°15'00"

R. 3 E. R. 4 E.

121°37'30" 121°35'00" 121°32'30" 121°30'00"

R. 3 E. R. 4 E.

Joins sheet 38, Burney Falls

Joins sheet 39, Dana

Joins sheet 40, Fall River Mills

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

EAST OF PONDOSA, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 27 OF 63

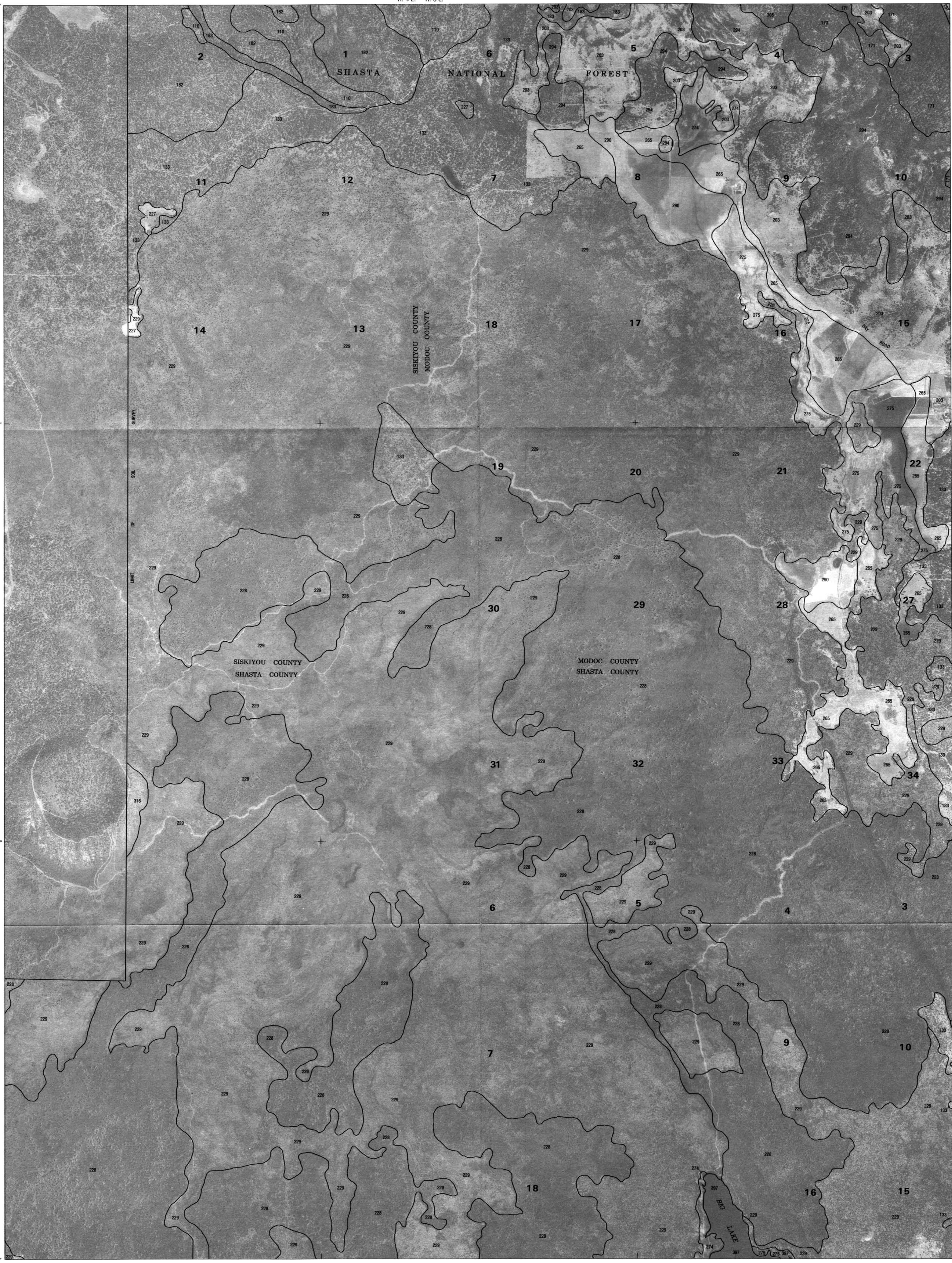
Joins sheet 13, Indian Spring Mountain

Joins sheet 14, White Horse

Joins sheet 15, Egg Lake

121°30'00" 121°27'30" R. 4 E. R. 5 E. 121°25'00" 121°22'30"

41°15'00"



41°12'30"

Joins sheet 27, East of Pondosa

Joins sheet 29, Day

T. 39 N.
41°10'00"
T. 38 N.

41°07'30"

121°30'00" 121°27'30" 121°25'00" 121°22'30"

Joins sheet 39, Dana

Joins sheet 40, Fall River Mills

Joins sheet 41, Pittville

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 14, White Horse

Joins sheet 15, Egg Lake

Joins sheet 16, Dollar Mountain

121°22'30" 121°20'00" R. 5 E. R. 6 E. 121°17'30" 121°15'00"

41°15'00"

41°12'30"

41°10'00"

41°07'30"

Joins sheet 28, Timbered Crater

Joins sheet 30, Lookout

121°22'30" R. 5 E. R. 6 E. 121°20'00" 121°17'30" 121°15'00"

Joins sheet 40, Fall River Mills

Joins sheet 41, Pittville

Joins sheet 42, Bieber

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

DAY, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 29 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
LOOKOUT QUADRANGLE
SHEET NUMBER 30 OF 63

Joins sheet 15, Egg Lake

Joins sheet 16, Donica Mountain

Joins sheet 17, Halls Canyon

121°15'00" R. 6 E. R. 7 E. 121°12'30" 121°10'00" 121°07'30"

41°15'00"

41°12'30"

Joins sheet 29, Day

Joins sheet 31, Big Swamp

T. 39 N.
T. 38 N.

41°10'00"

41°07'30"

121°15'00" R. 6 E. R. 7 E. 121°12'30" 121°10'00" 121°07'30"

Joins sheet 42, Bieber

Joins sheet 41, Pittville

Joins sheet 43, Hog Valley

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

LOOKOUT, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 30 OF 63

Joins sheet 16, Donica Mountain

Joins sheet 17, Halls Canyon

Joins sheet 18, Adin Pass

121°07'30" 121°05'00" 121°02'30" 121°00'00"

41°15'00" R. 7 E. R. 8 E. 41°15'00"

41°12'30" 41°12'30"

Joins sheet 30, Lookout

Joins sheet 32, Adin

T. 39 N. T. 38 N. 41°10'00" T. 39 N. T. 38 N. 41°10'00"

41°07'30" R. 7 E. R. 8 E. 41°07'30"

121°07'30" 121°05'00" 121°02'30" 121°00'00"

Joins sheet 42, Bieber

Joins sheet 43, Hog Valley

Joins sheet 44, Letterbox Hill

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

BIG SWAMP, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 31 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
ADIN QUADRANGLE
SHEET NUMBER 32 OF 63

Joins sheet 17, Fitch Canyon

Joins sheet 18, Adin Pass

Joins sheet 19, Hemlet Butte

121°00'00" R. 8 E. R. 9 E. 120°57'30" 120°55'00" 120°52'30"

41°15'00"

41°12'30"

41°10'00"

T. 39 N.
T. 38 N.

41°07'30"

Joins sheet 31, Big Swamp

Joins sheet 33, Ambrose Valley

121°00'00" R. 8 E. R. 9 E. 120°57'30" 120°55'00" 120°52'30"

Joins sheet 43, Hog Valley

Joins sheet 44, Letterbox Hill

Joins sheet 45, Lane Reservoir

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and cultural information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1 MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETERS

QUADRANGLE LOCATION

ADIN, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 32 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

AMBROSE VALLEY, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 33 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

KNOX MOUNTAIN, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 34 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
SHOEINHORSE MOUNTAIN QUADRANGLE
SHEET NUMBER 35 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

SHOEINHORSE MOUNTAIN, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 35 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
BIG BEND QUADRANGLE
SHEET NUMBER 36 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

BIG BEND, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 36 OF 63

Joins sheet 24, Grizzly Peak

Joins sheet 25, Dead Horse Summit

Joins sheet 26, Pondosa

Joins sheet 36, Big Bend

Joins sheet 38, Burney Falls

Joins sheet 46, Chalk Mountain

Joins sheet 47, Burney

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

SKUNK RIDGE, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 37 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
BURNEY FALLS QUADRANGLE
SHEET NUMBER 38 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 10.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

BURNEY FALLS, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 38 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
DANA QUADRANGLE
SHEET NUMBER 39 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1 MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETERS

QUADRANGLE LOCATION

DANA, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 39 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
FALL RIVER MILLS QUADRANGLE
SHEET NUMBER 40 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 10.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

FALL RIVER MILLS, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 40 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 28, Timbered Crater

Joins sheet 29, Day

Joins sheet 30, Lookout

121°22'30" 121°20'00" 121°17'30" 121°15'00"

R. 5 E. R. 6 E.

41°07'30"

41°05'00"

T. 38 N.
T. 37 N.

41°02'30"

41°00'00"

Joins sheet 40, Fall River Mills

Joins sheet 42, Bieber

R. 5 E. R. 6 E.

121°22'30" 121°20'00" 121°17'30" 121°15'00"

Joins sheet 49, Hogback Ridge

Joins sheet 50, Coble Mountain

Joins sheet 51, Little Valley

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

PITTVILLE, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 41 OF 63

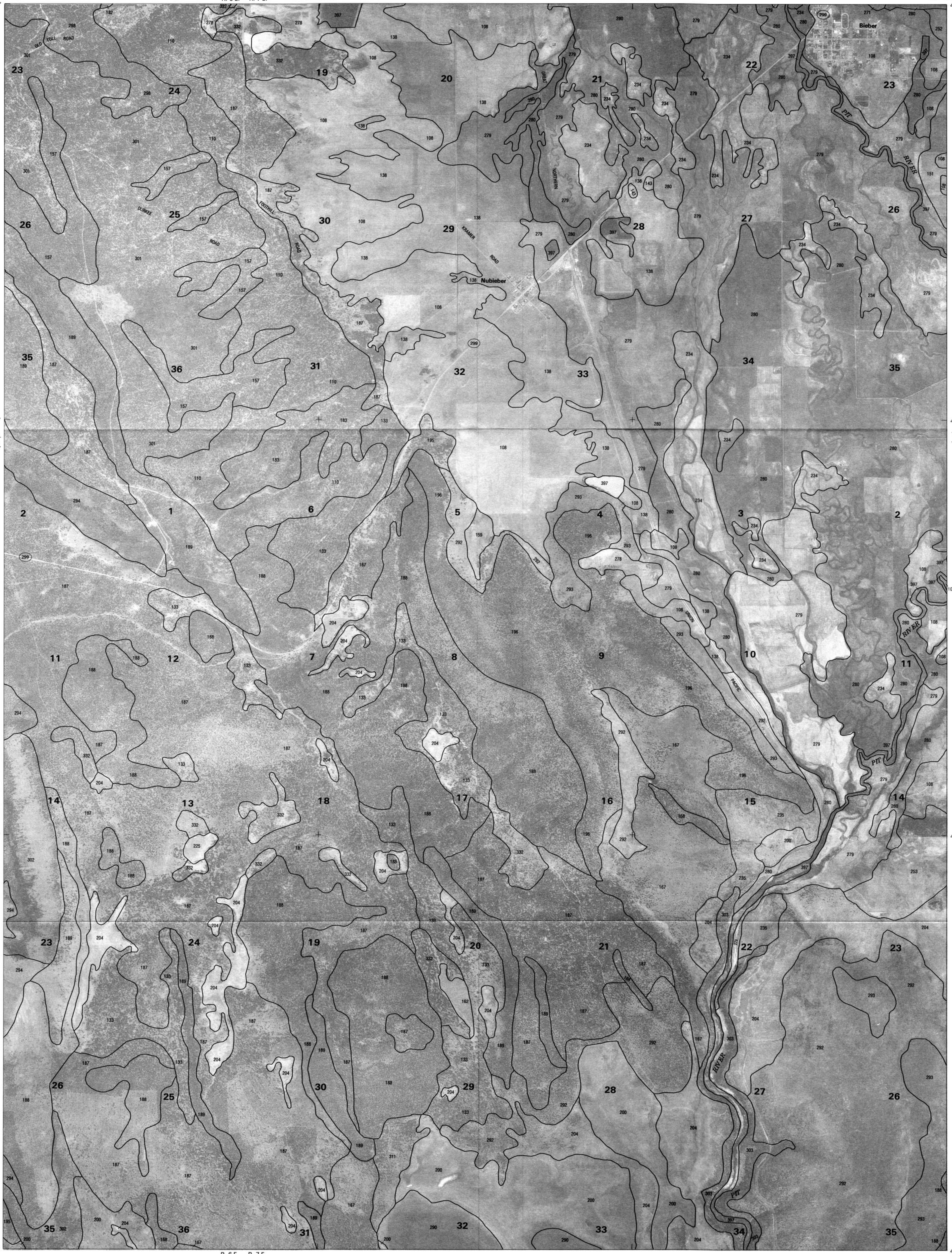
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
BIEBER QUADRANGLE
SHEET NUMBER 42 OF 63

Joins sheet 29, Day

Joins sheet 30, Lookout

Joins sheet 31, Big Swamp



Joins sheet 41, Pittville

Joins sheet 43, Hog Valley

Joins sheet 50, Cable Mountain

Joins sheet 51, Little Valley

Joins sheet 52, Dana Peak

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

BIEBER, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 42 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
HOG VALLEY QUADRANGLE
SHEET NUMBER 43 OF 63

Joins sheet 30, Lookout

Joins sheet 31, Big Swamp

Joins sheet 32, Adin

121°07'30" 41°07'30" R. 7 E. R. 8 E. 121°05'00" 121°02'30" 121°00'00" 41°07'30"

41°05'00" T. 38 N. T. 37 N.

41°05'00" T. 38 N. T. 37 N.

Joins sheet 42, Bieber

Joins sheet 44, Letterbox Hill

41°02'30"

41°02'30"

41°00'00" 121°07'30" R. 7 E. R. 8 E. 121°05'00" 121°02'30" 41°00'00" 121°00'00"

Joins sheet 52, Dixie Peak

Joins sheet 51, Little Valley

Joins sheet 53, Silva Flat Reservoir

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 10.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

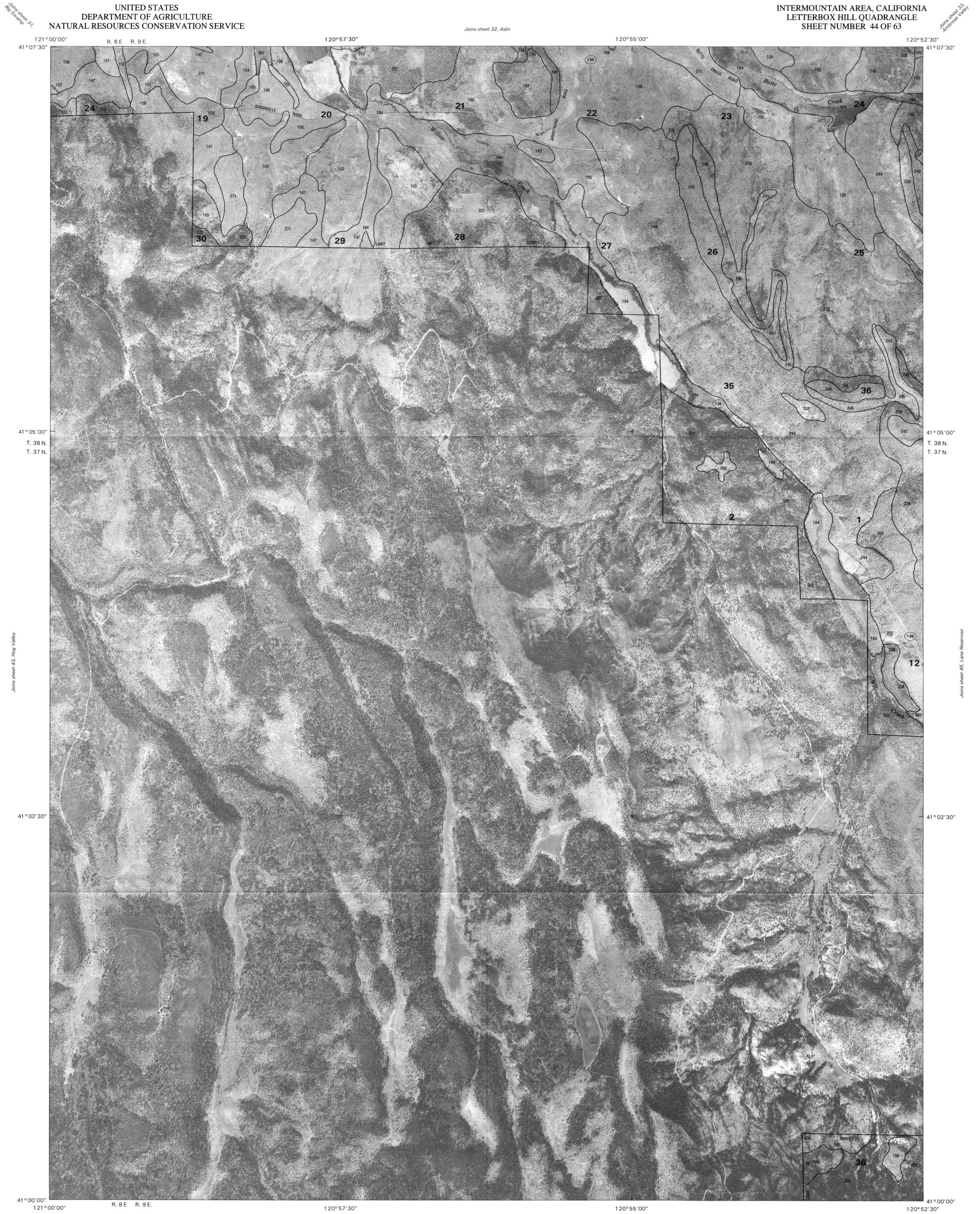
1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

HOG VALLEY, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 43 OF 63



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

LETTERBOX HILL, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 44 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

LANE RESERVOIR, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 45 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

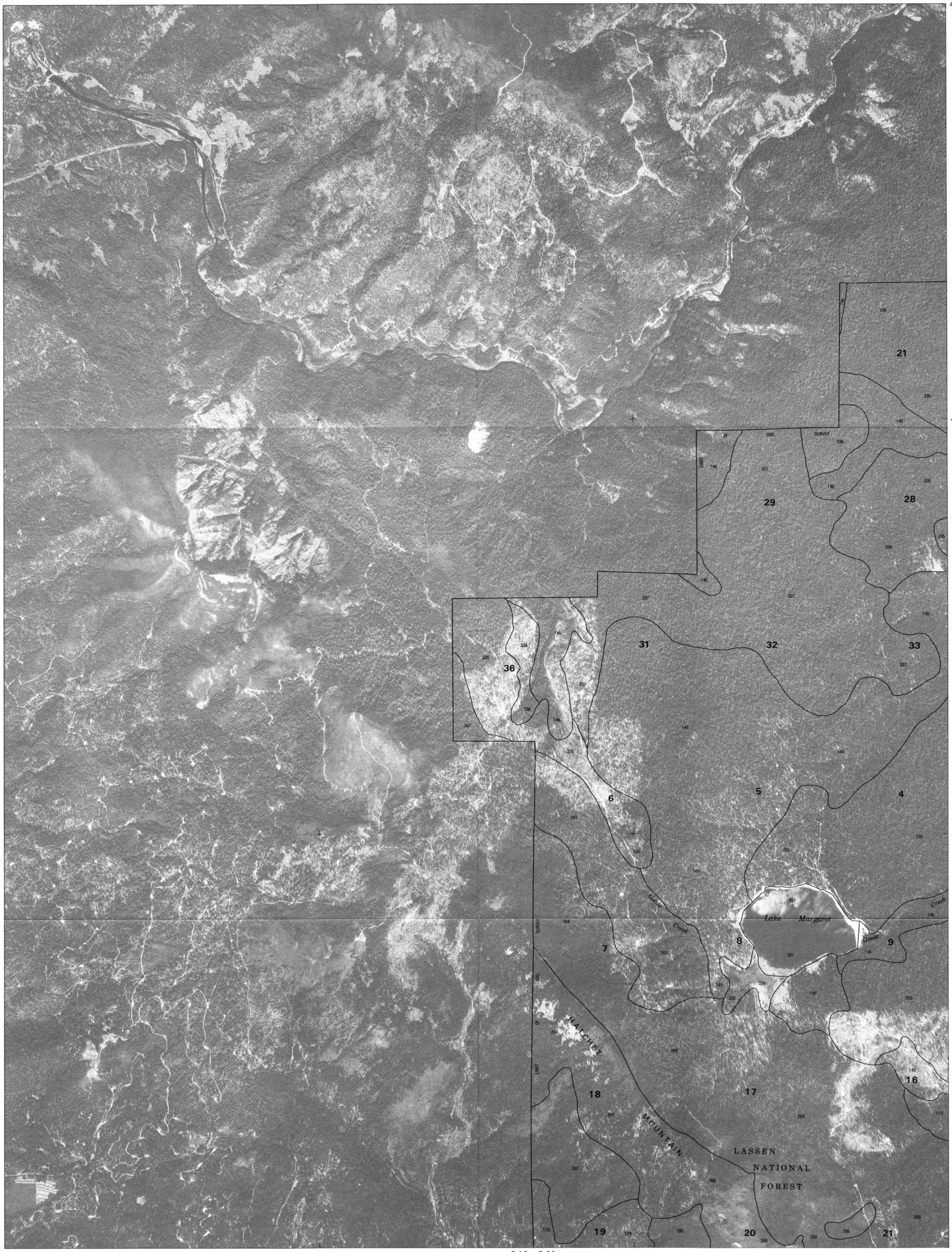
Joins sheet 36, Big Bend

Joins sheet 37, Skunk Ridge

Joins sheet 38, Burney Falls

121°52'30" 121°50'00" 121°47'30" 121°45'00"

41°00'00" 41°00'00"



40°57'30" 40°57'30"

Joins sheet 47, Burney

T. 36 N.
T. 35 N.

40°55'00" 40°55'00"

40°52'30" 40°52'30"

121°52'30" 121°50'00" R. 1 E. R. 2 E. 121°47'30" 121°45'00"

Joins sheet 55, Hatchet Mountain Pass

Joins sheet 56, Burney Mountain West

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

CHALK MOUNTAIN, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 46 OF 63

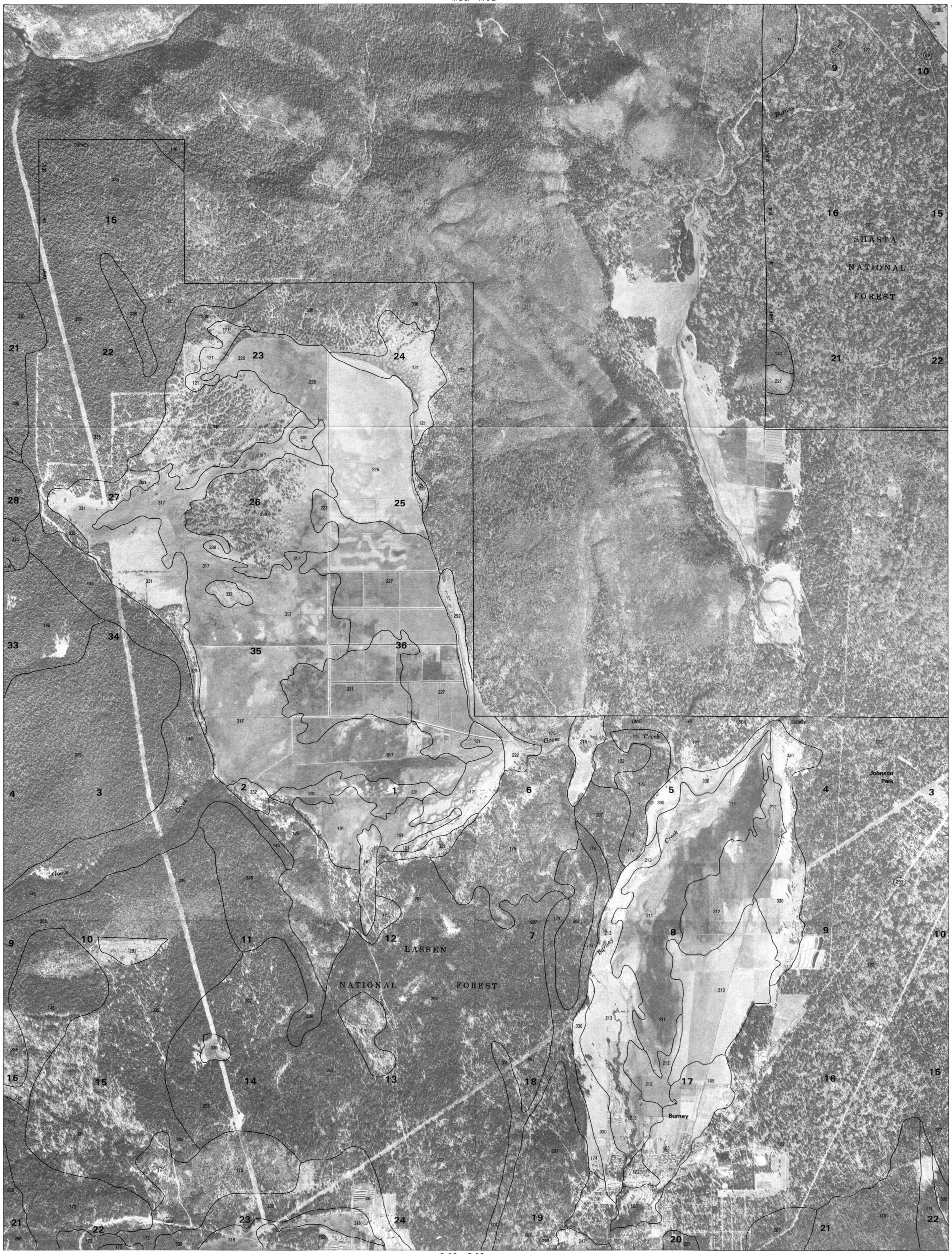
Joins sheet 37, Skunk Ridge

Joins sheet 38, Burney Falls

Joins sheet 39, Dana

121°45'00" 121°42'30" R. 2 E. R. 3 E. 121°40'00" 121°37'30"

41°00'00"



40°57'30"

T. 36 N.
T. 35 N.

40°55'00"

40°52'30"

Joins sheet 46, Chalk Mountain

Joins sheet 48, Cassel

121°45'00" 121°42'30" R. 2 E. R. 3 E. 121°40'00" 121°37'30"

Joins sheet 56, Burney Mountain West

Joins sheet 55, Hatchet Mountain Pass

Joins sheet 57, Burney Mountain East

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

BURNEY, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 47 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 10.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000
1 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000
FEET
1 0 1
KILOMETERS

QUADRANGLE LOCATION

CASSEL, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 48 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
HOGBACK RIDGE QUADRANGLE
SHEET NUMBER 49 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27), Clarke 1866 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 10.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

HOGBACK RIDGE, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 49 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
COBLE MOUNTAIN QUADRANGLE
SHEET NUMBER 50 OF 63

Joins sheet 40, Fall River Mills

Joins sheet 41, Pittville

Joins sheet 42, Bieber

121°22'30" 121°20'00" 121°17'30" 121°15'00"

R. 5 E. R. 6 E.

41°00'00"

T. 37 N.
T. 36 N.

40°57'30" 40°57'30"

Joins sheet 49, Hogback Ridge

Joins sheet 51, Little Valley

40°55'00" 40°55'00"

T. 36 N.
T. 35 N.

40°52'30" 40°52'30"

121°22'30" 121°20'00" 121°17'30" 121°15'00"

Joins sheet 58, Murken Bench

Joins sheet 59, Cordes Reservoir

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

COBLE MOUNTAIN, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 50 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

LITTLE VALLEY, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 51 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
DIXIE PEAK QUADRANGLE
SHEET NUMBER 52 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

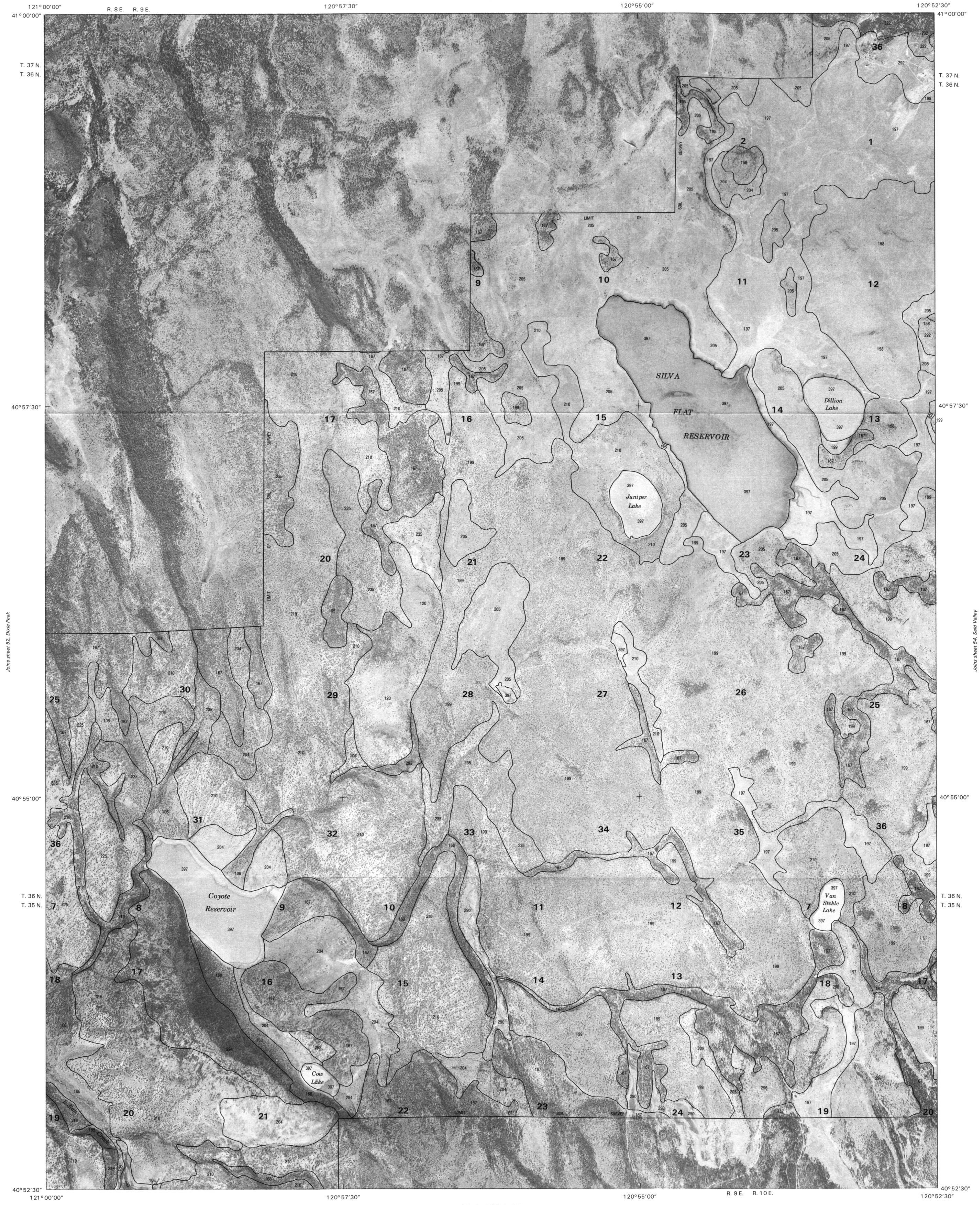
1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

DIXIE PEAK, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 52 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

SILVA FLAT RESERVOIR, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 53 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
SAID VALLEY QUADRANGLE
SHEET NUMBER 54 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

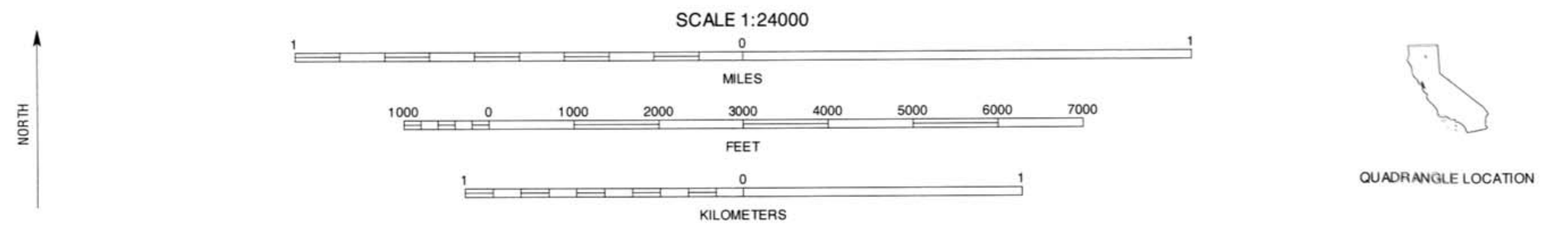
SAID VALLEY, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 54 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
HATCHET MOUNTAIN PASS QUADRANGLE
SHEET NUMBER 55 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



HATCHET MOUNTAIN PASS, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 55 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
BURNEY MOUNTAIN WEST QUADRANGLE
SHEET NUMBER 56 OF 63

Joins sheet 46, Chalk Mountain

Joins sheet 48, Cassel

Joins sheet 47, Burney

121° 45′ 00″ | 121° 42′ 30″ | R. 2 E. R. 3 E. | 121° 40′ 00″ | 121° 37′ 30″

40° 52′ 30″

T. 35 N.
T. 34 N.

40° 50′ 00″

Joins sheet 55, Hatchet Mountain Pass

Joins sheet 57, Burney Mountain East

40° 47′ 30″

T. 34 N.
T. 33 N.

40° 45′ 00″

121° 45′ 00″ | 121° 42′ 30″ | R. 2 E. R. 3 E. | 121° 40′ 00″ | 121° 37′ 30″

Joins sheet 63, Jacks Backbone

Joins sheet 62, Miller Mountain

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1 MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETERS

QUADRANGLE LOCATION

BURNEY MOUNTAIN WEST, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 56 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
BURNEY MOUNTAIN EAST QUADRANGLE
SHEET NUMBER 57 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

BURNEY MOUNTAIN EAST, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 57 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
MURKEN BENCH QUADRANGLE
SHEET NUMBER 58 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

MURKEN BENCH, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 58 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
CORDERS RESERVOIR QUADRANGLE
SHEET NUMBER 59 OF 63

Joins sheet 50, Cable Mountain

Joins sheet 51, Little Valley

Joins sheet 52, Dixie Peak

121°15'00" R. 6 E. R. 7 E. 121°12'30" 121°10'00" 121°07'30"

40°52'30" 40°52'30"

T. 35 N.
T. 34 N.

40°50'00" 40°50'00"

Joins sheet 60, Straylor Lake

40°47'30" 40°47'30"

T. 34 N.
T. 33 N.

40°45'00" 40°45'00"

121°15'00" R. 6 E. R. 7 E. 121°12'30" 121°10'00" 121°07'30"

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

CORDERS RESERVOIR, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 59 OF 63

Joins sheet 51, Little Valley

Joins sheet 52, Dixie Peak

Joins sheet 53, Silva Flat Reservoir

121°07'30" 121°05'00" 121°02'30" R. 8 E. R. 9 E. 121°00'00"

40°52'30"

T. 35 N. T. 34 N.

40°50'00"

Joins sheet 59, Corders Reservoir

Joins sheet 61, Bullard Lake

40°47'30"

T. 34 N. T. 33 N.

40°45'00"

121°07'30" 121°05'00" 121°02'30" R. 8 E. R. 9 E. 121°00'00"

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1 MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETERS

QUADRANGLE LOCATION

STRAYLOR LAKE, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 60 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
BULLARD LAKE QUADRANGLE
SHEET NUMBER 61 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

BULLARD LAKE, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 61 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

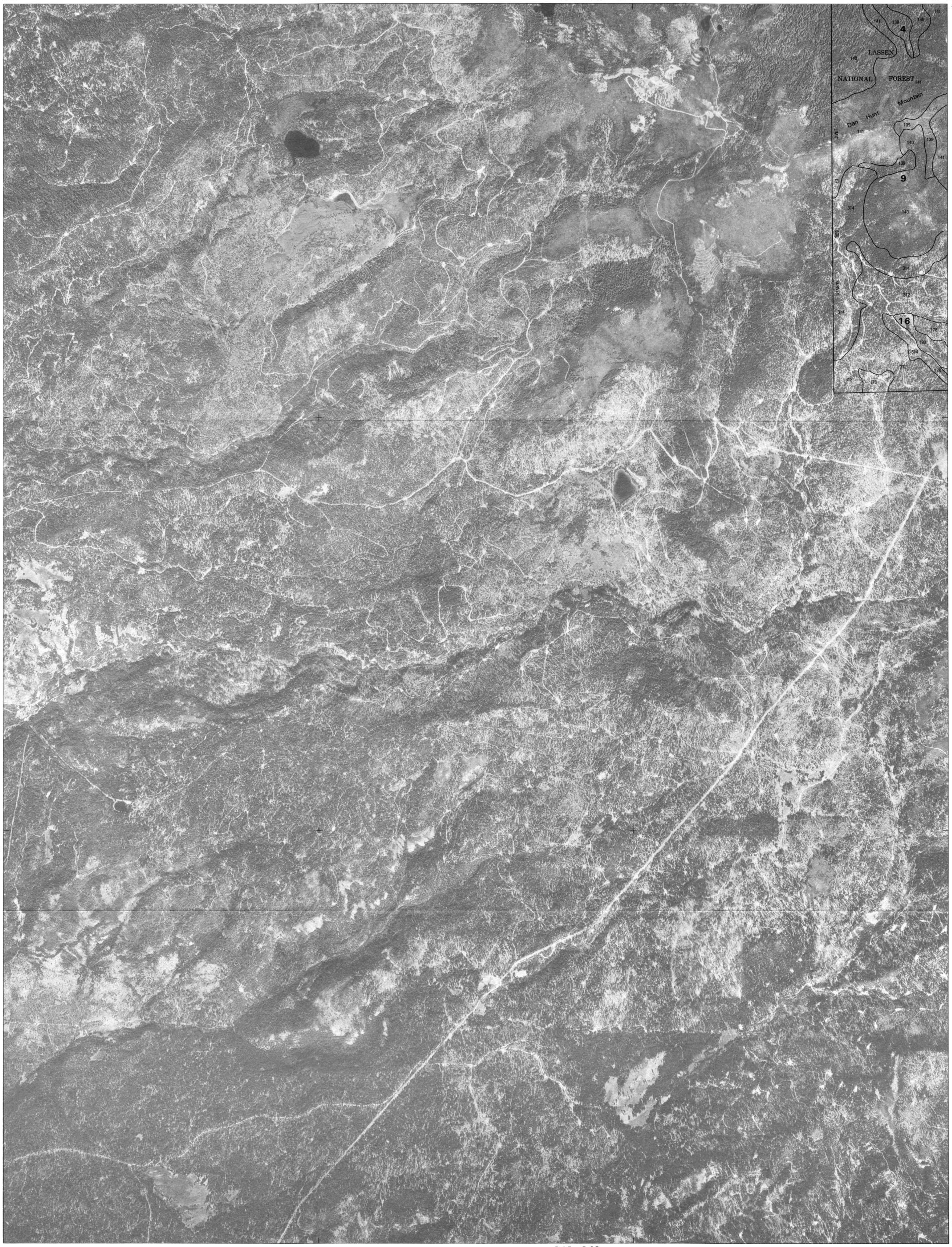
INTERMOUNTAIN AREA, CALIFORNIA
MILLER MOUNTAIN QUADRANGLE
SHEET NUMBER 62 OF 63

Joins sheet 55, Hatchet Mountain Pass

Joins sheet 56, Burney Mountain West

121°52'30" 121°50'00" R. 1 E. R. 2 E. 121°47'30" 121°45'00"

40°45'00"



40°42'30"

40°40'00"

T. 33 N.
T. 32 N.

40°37'30"

121°52'30" 121°50'00" R. 1 E. R. 2 E. 121°47'30" 121°45'00"

Joins sheet 63, Jacks Backbone

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

MILLER MOUNTAIN, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 62 OF 63

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

INTERMOUNTAIN AREA, CALIFORNIA
JACKS BACKBONE QUADRANGLE
SHEET NUMBER 63 OF 63

Joins sheet 55, Hatchet Mountain Pass

Joins sheet 56, Burney Mountain West

Joins sheet 57, Burney Mountain East

121° 45′00″ 121° 42′30″ 121° 40′00″ 121° 37′30″

R. 2 E. R. 3 E.

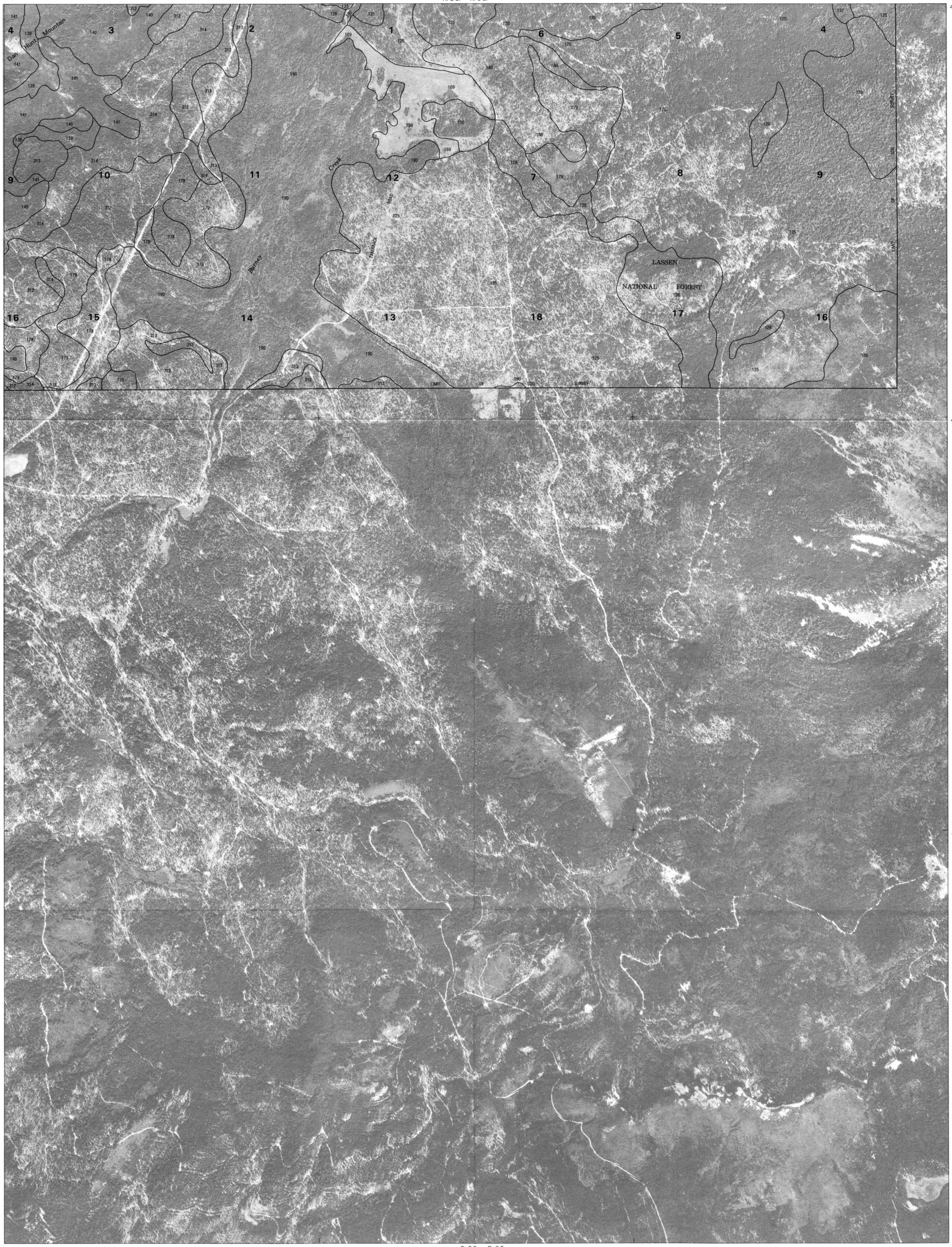
40° 45′00″ 40° 45′00″

40° 42′30″ 40° 42′30″

Joins sheet 62, Miller Mountain

T. 33 N.
T. 32 N.
40° 40′00″

T. 33 N.
T. 32 N.
40° 40′00″



40° 37′30″ 40° 37′30″

R. 2 E. R. 3 E.

121° 45′00″ 121° 42′30″ 121° 40′00″ 121° 37′30″

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1975-1980 aerial photography. Hydrography and culture information were acquired from U.S. Geological Survey.

North American Datum of 1927 (NAD27). Clarke 1866 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

QUADRANGLE LOCATION

JACKS BACKBONE, CALIFORNIA
7.5 MINUTE SERIES
SHEET NUMBER 63 OF 63